OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

OLUME 44, NO. 15
ULY 18, 1955

AMERICAN

DYESTUFF REPORTER

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AD 7

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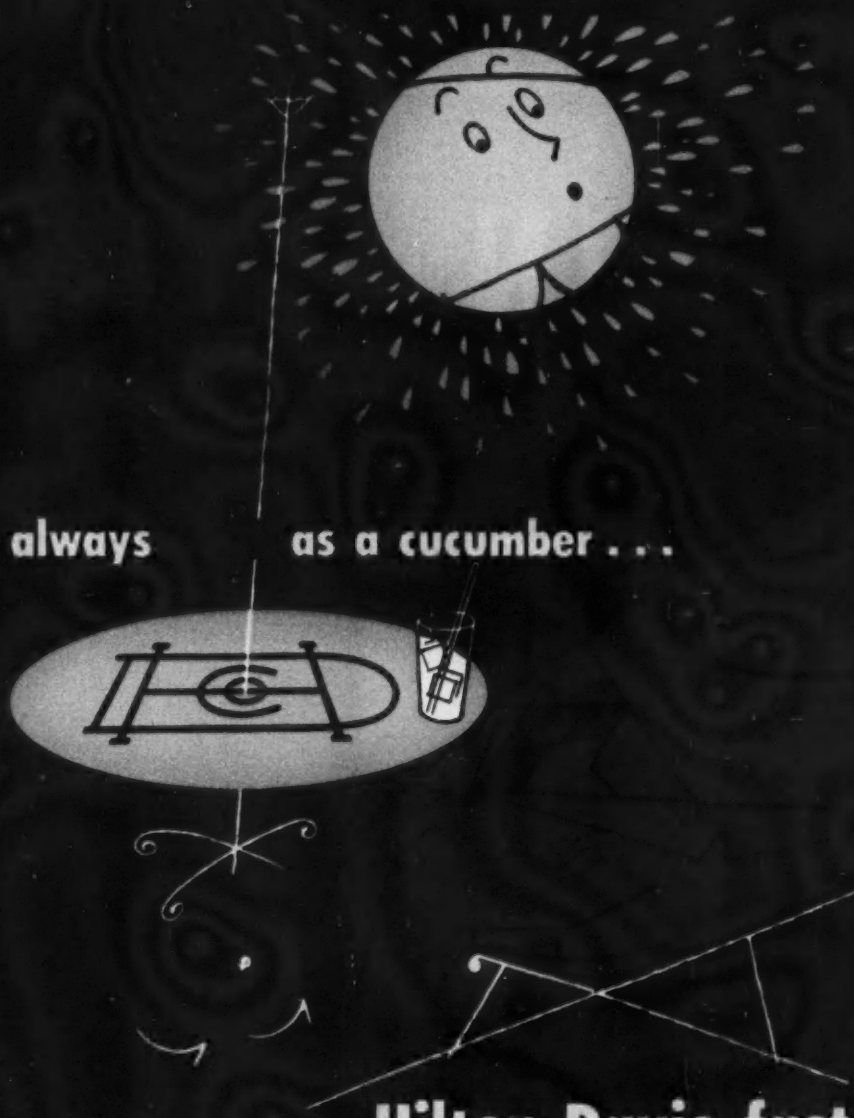

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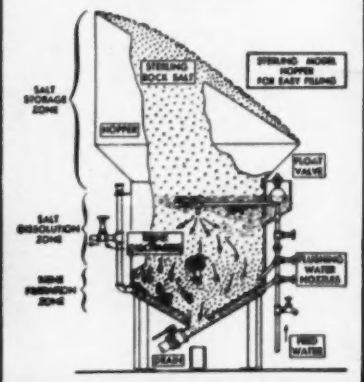

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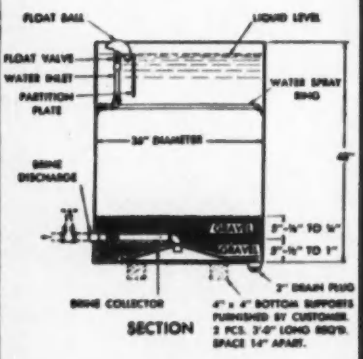

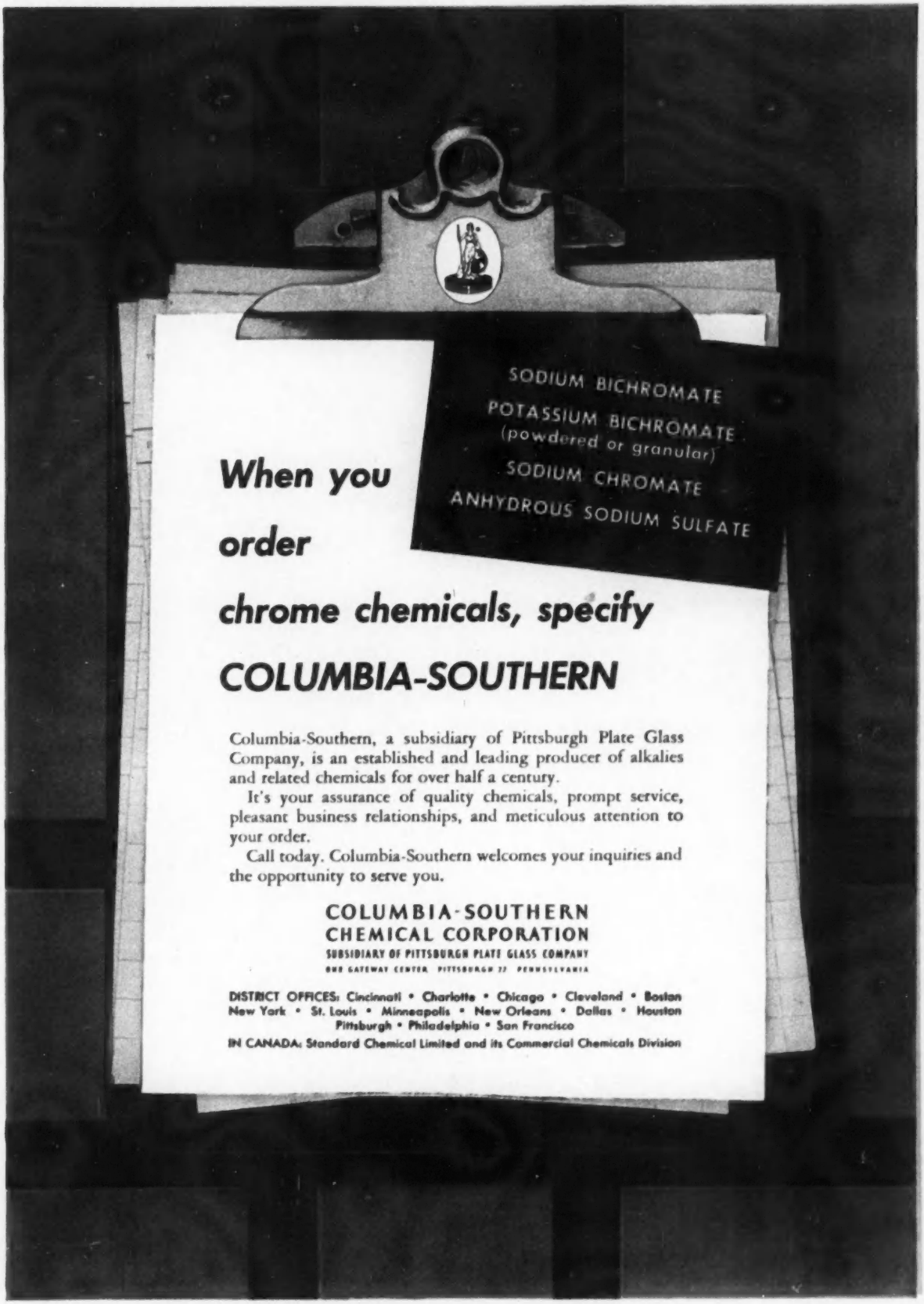

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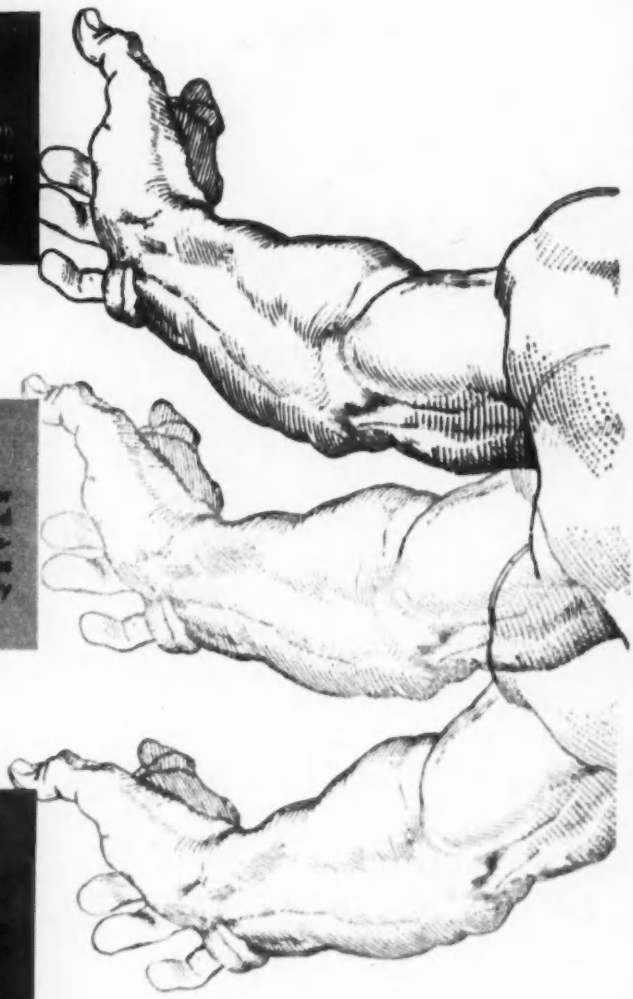

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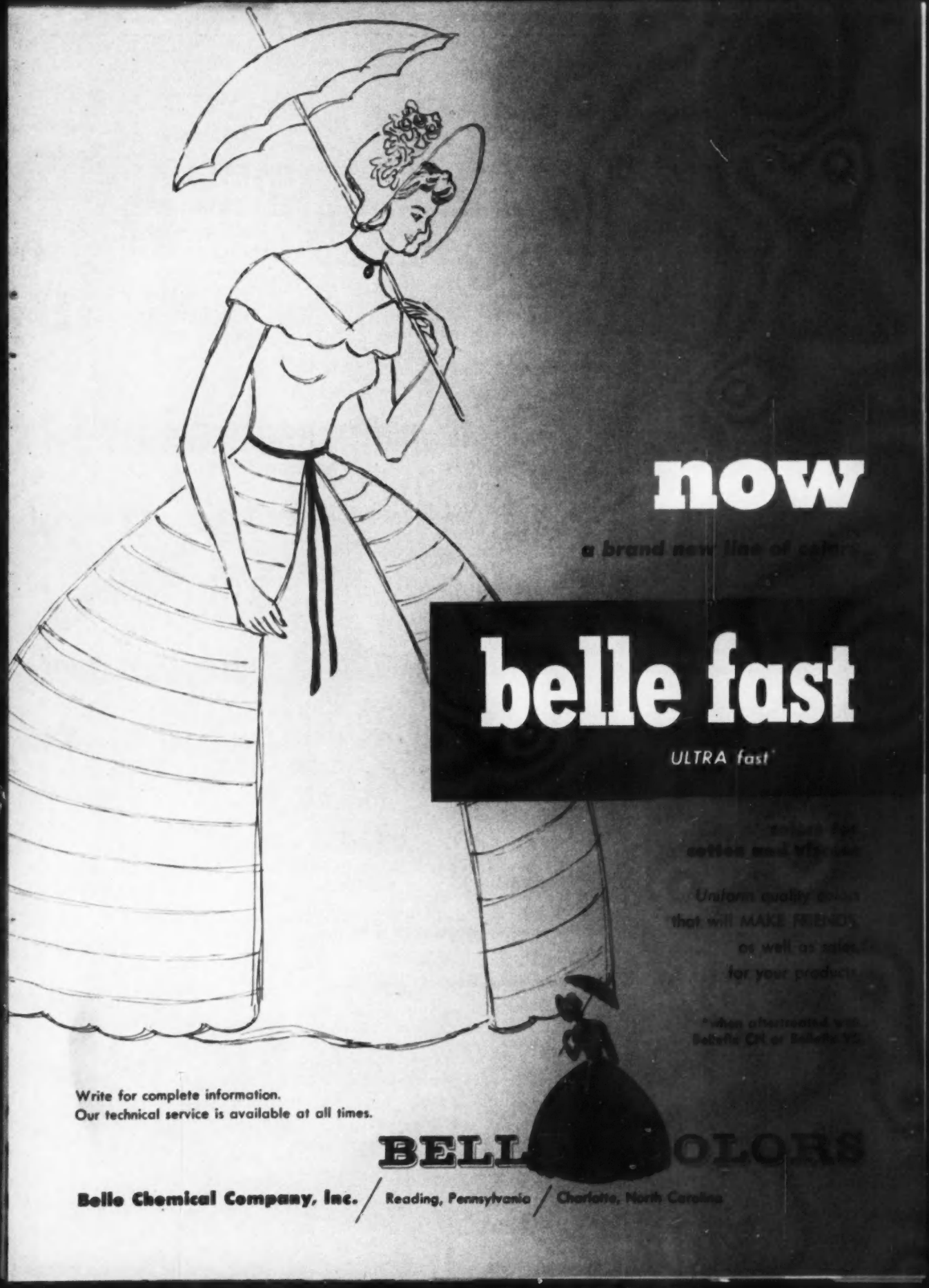
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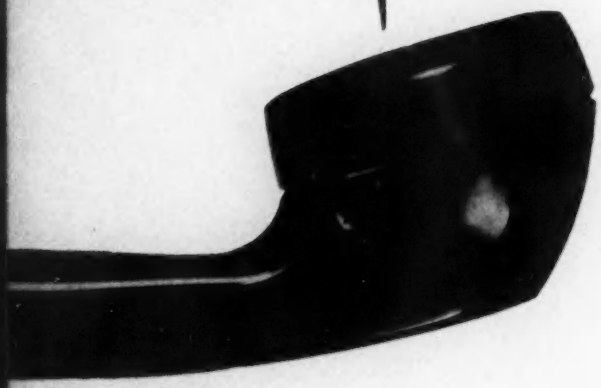

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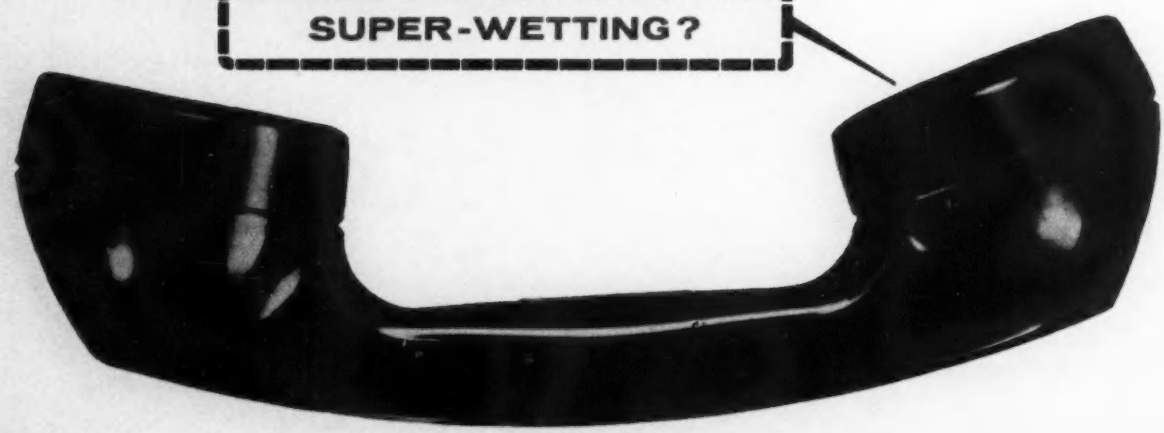

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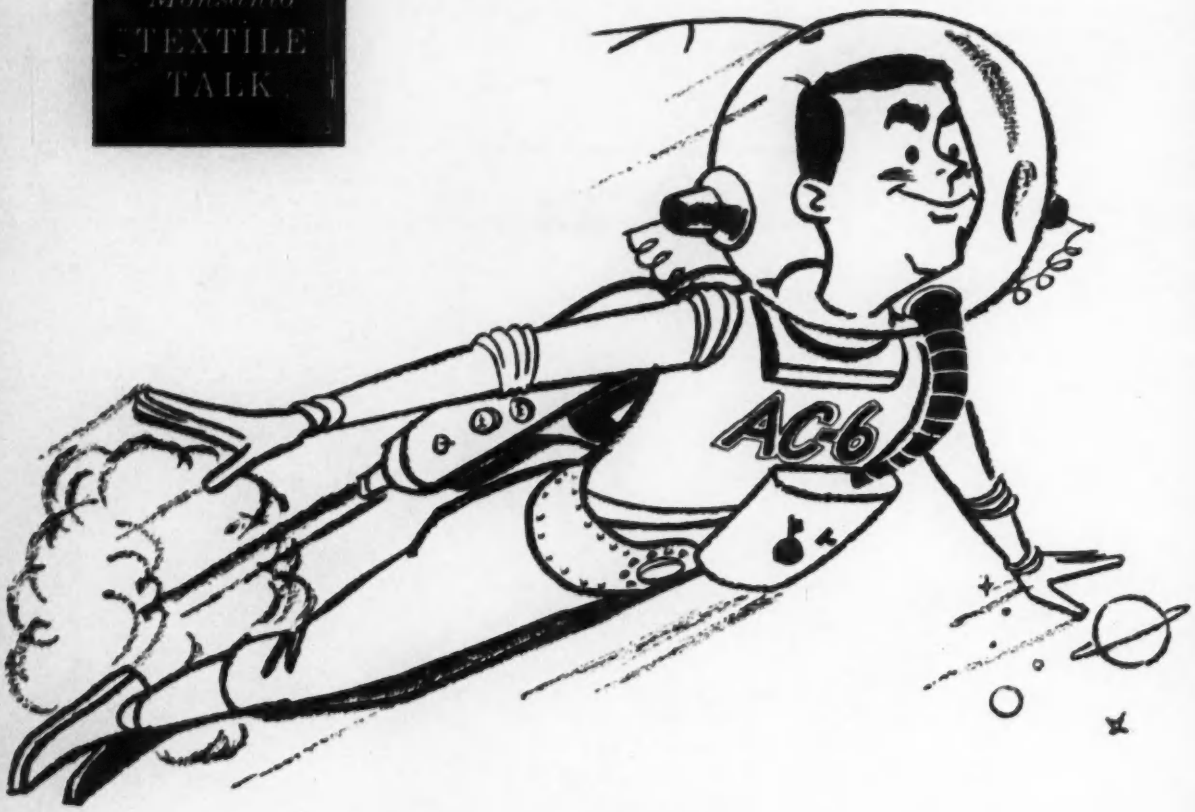

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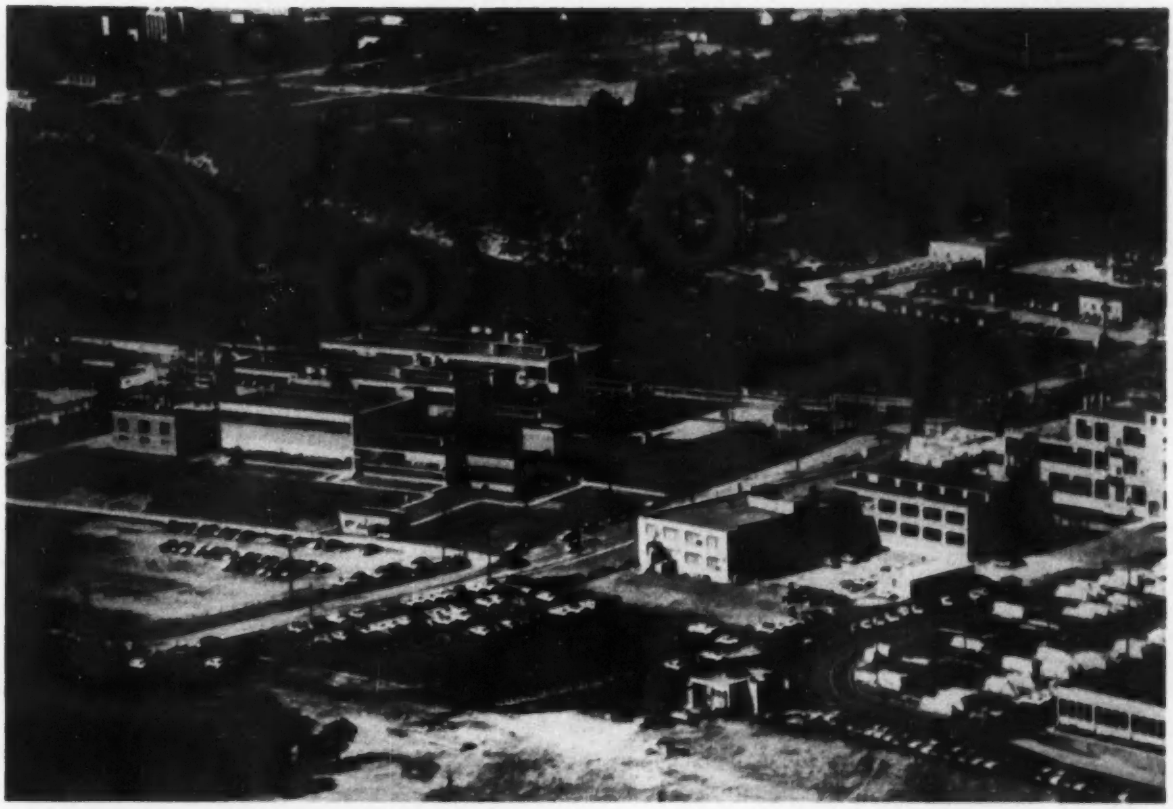

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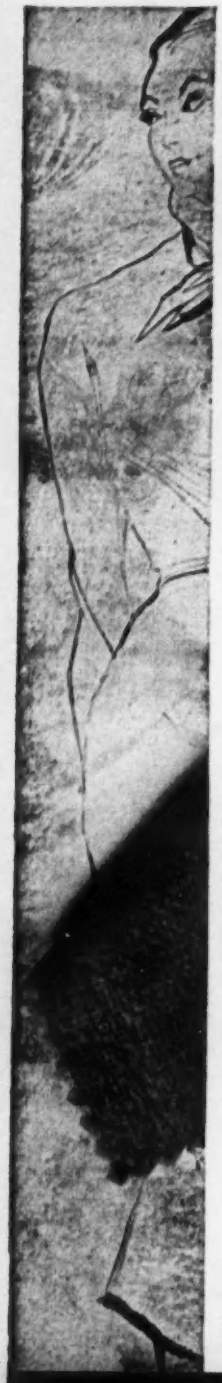

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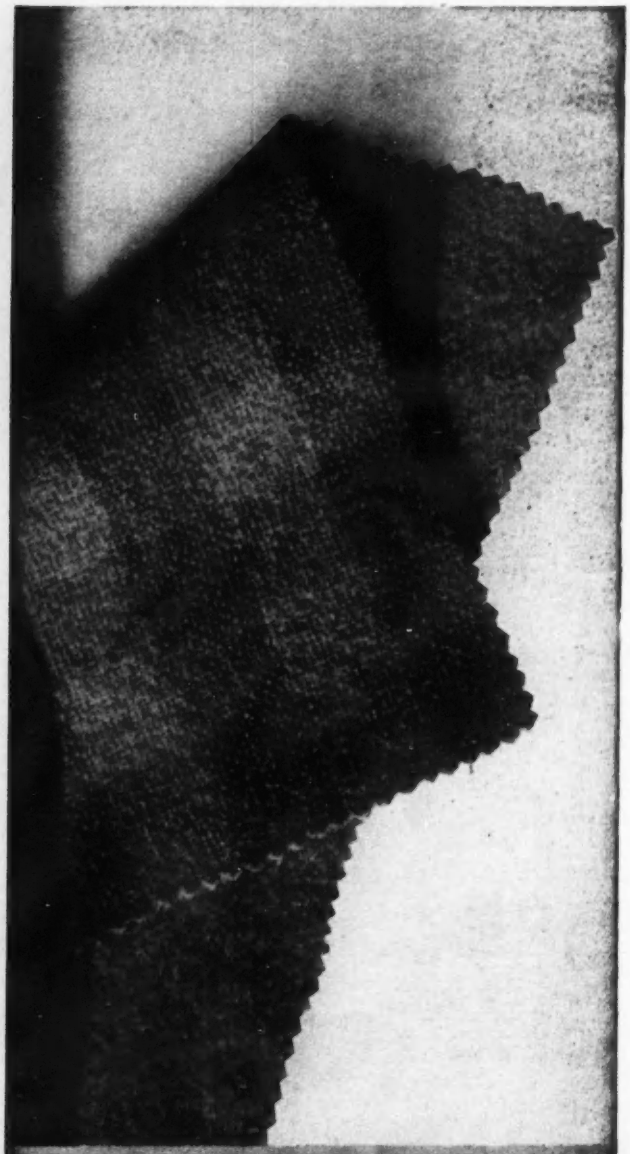

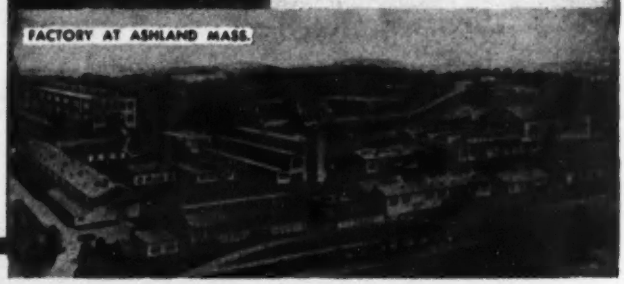

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Yes... Here's wool that really IS wool— and really, truly washable!

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● Schollerizing Prevents Shrinkage in Wool by Eliminating Matting and Felting ... a process that is safe, uniform and requires no extraordinary skills in its application.

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WASHABLE WOOL
SAFE TO TUB • SAFE TO RUB

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INCORPORATED
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P. O. BOX 506 PHONE FR 6-6514 OLD CONCORD RD.
Charlotte, North Carolina

Dear Jim:

Here is a snapshot of my boys. I know that you would like to see the men who solved your problems by producing that special polyvinyl acetate for your specific need. So many people have heard that we do attack each mill's problem individually and have made so many modifications in the emulsion polymers and copolymers for natural and synthetic yarns and fabrics, that we are building a new plant to accommodate the terrific demands.

I remember how skeptical some folks were when we began the individual approach. On the surface it did seem foolish. I heard so many complaints from plant supervisors and dye chemists who had tried one company after another and product after product without success, that I just had to tailor a specific product for the specific need. Now these users are certain that each product will have the same standards each time it is used. The peace of mind in this one fact means a lot, to say nothing of the actual savings.

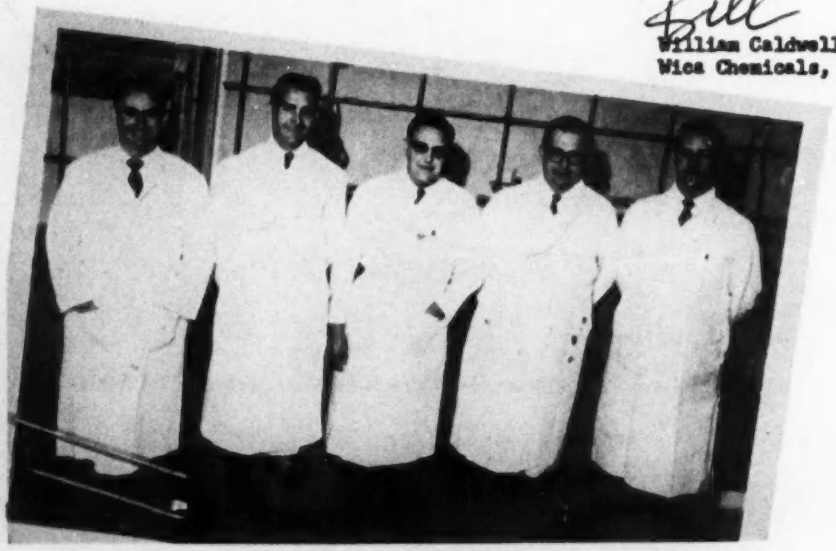
As soon as the new plant is completed, I'll send you another snapshot. We're really proud of our progress and success that enables us to build and expand. The credit should go to you and the other mills who called on us for the answer and got the right one.

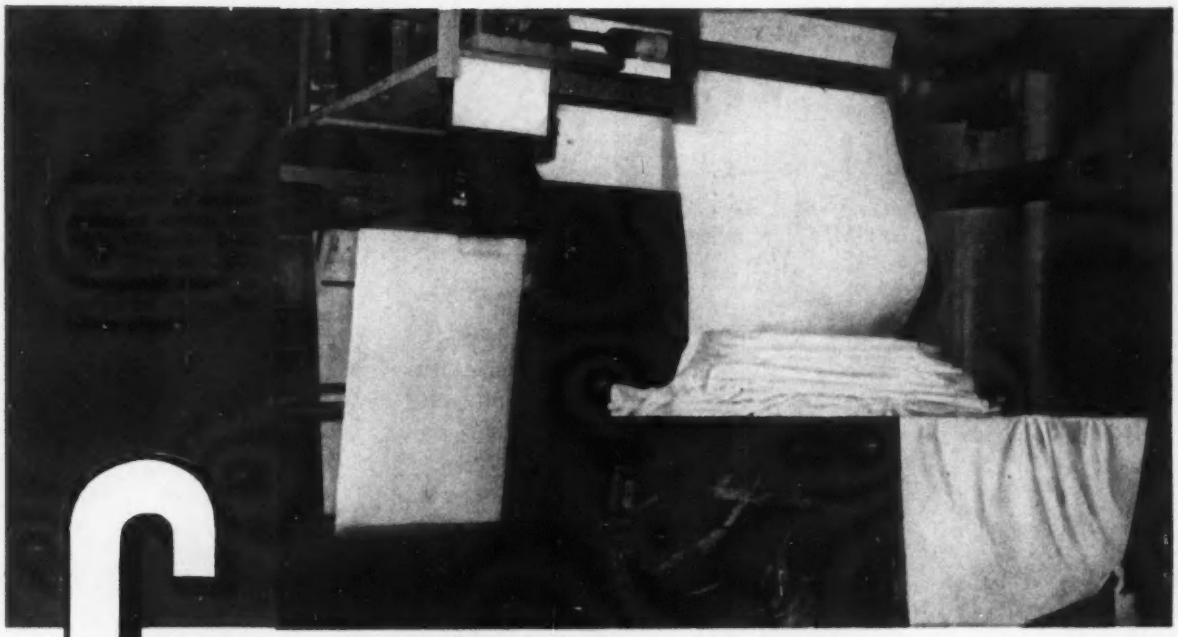
I'm looking forward to the opportunity of helping you with any other problems that you may have with your own new developments, whether in the fields of latices or resin emulsions.

Sincerely,

Bill

William Caldwell
Wica Chemicals, Incorporated





Controlled CHLORINE RETENTION

OF CREASE RESISTANT COTTON FABRICS!

Finished with STANSET LC, millions of yards of white cotton shirting fabrics — as made up by one of the largest shirting manufacturers — have withstood repeated commercial laundering *WITHOUT* noticeable yellowing or significant loss in strength due to the action of chlorine bleaching.

BUILD YOUR OWN TRADE MARK

Leading cotton finishing companies are building valuable reputations for their own important trade marks with STANSET D 40 and STANSET LC.

INCREASED EFFICIENCY

STANSET D 40 and STANSET LC are new, highly efficient cross-linking compounds which *really* set the shrinkage of cotton fabrics with that additional bounce — at low cost!

EXCELLENT PHYSICAL PROPERTIES

Fabrics finished with STANSET D 40 and STANSET LC may be cured over a wide range of temperatures, from 250°F. to 340°F., for 70 to 90 seconds, to fit almost every fabric construction, assuring the highest crease resistance, tensile and tear, in conjunction with CONTROLLED CHLORINE RETENTION.

NEW STANSET EASY TO APPLY

The application of STANSET resins requires no equipment other than that now in use for resin treatment in mills and finishing plants.

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Our technical representatives are at your service.

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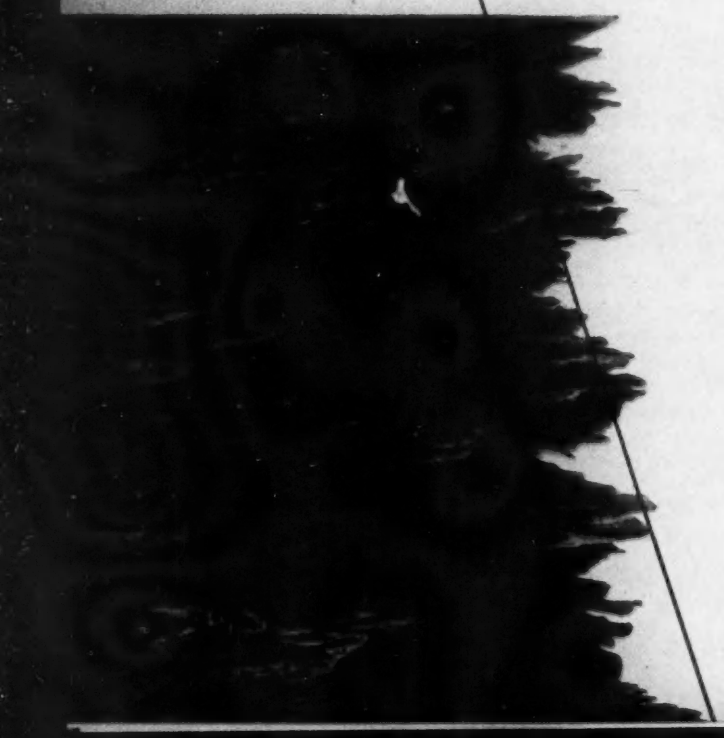
FOR PRINTING AND DYEING



THE MOST COLORS...

THE MOST *Beautiful* COLORS

FOR YOUR DOLLAR

Brighten your sales picture! Use AULABRITE when printing or pad dyeing with emulsion pigment colors. Scrub-fast *brilliant* colors, beautifully soft hand, good running properties—all at *significantly lower cost*—these are the reasons why AULABRITE is the bright idea on the textile horizon. Write for complete information.

AULA CHEMICALS, INC.

Box 494, 714 Division St., Elizabeth, N. J.
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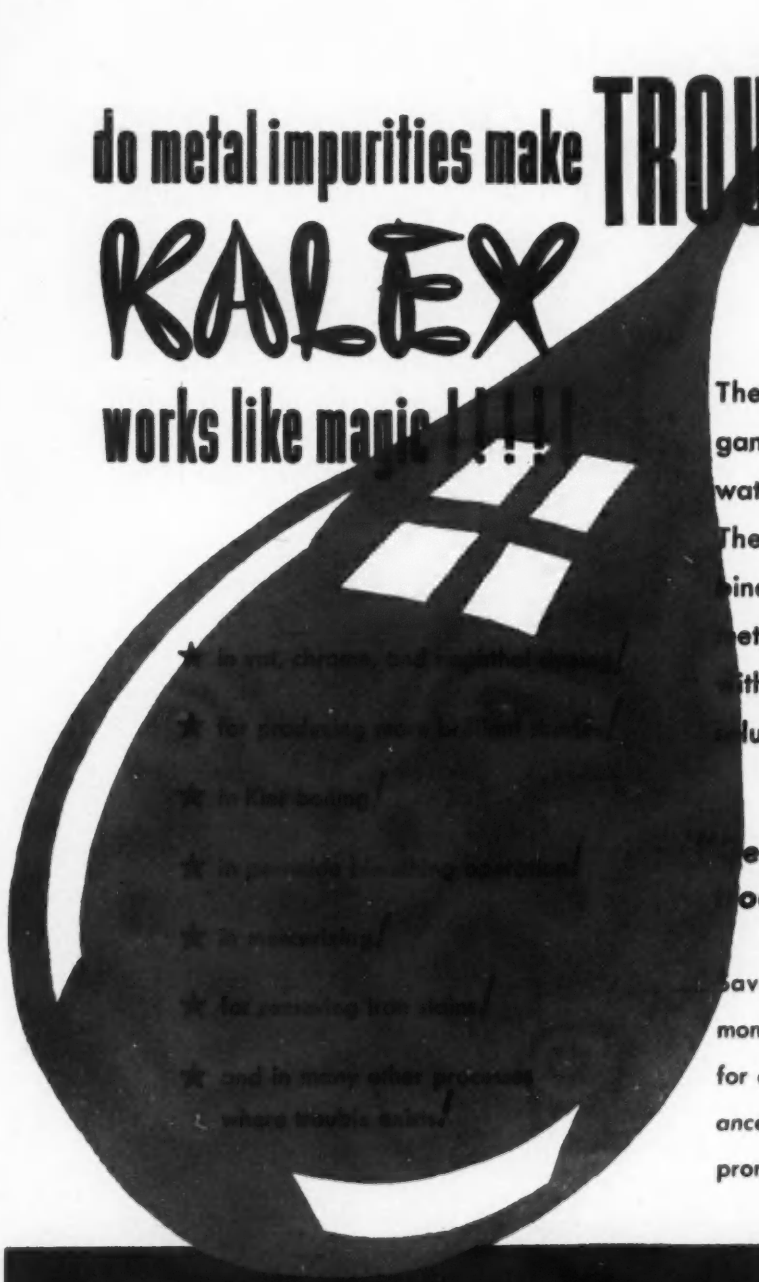
do metal impurities make TROUBLE for you?

KALEX works like magic!!!!



The KALEX products are organic sequestering agents, or water-soluble ion exchangers. They have the property of binding and deionizing heavy metal and alkali earth ions, without removing them from solution.

"...et to the HART of the ...ouble...get KALEX!"

Save yourself time, worry, and money! Write, wire, or phone *now* for a sample. Proof is in *performance*. Top technical service and prompt delivery are assured.

HART PRODUCTS CORPORATION

REQUIRED READING FOR COST-CONSCIOUS TEXTILE MEN!

Fashion Moves To Prints

and leading textile printers use Jacques Wolf Printing Gums

Superclear Gum All Viscosities

Used for machine and screen printing of all types of textile fabrics. Produces bright prints with sharp outlines and very fine detail.

Gum Tragacanth Solution

Made by a patented process. Used with Acid, Direct or Insoluble Azo Dyestuffs for screen printing, this gum gives exceptionally clear, sharp prints.

Super Gum H

Full flow for roller and screen printing application. High color value, easy to handle. Compatible with all colors. Effective in alkaline or acid medium.

Screen Gum W-1141-B

Used as thickener for Rapidogen and Indigosol type dyestuffs. Good color value; excellent mark and washes easily.

the textile industry's best source, the country's largest importer and exporter of gums. Jacques Wolf products and services can surely be adapted to your operation—to improve your processing techniques, reduce costs, or actually give you a great variety of unseen benefits.

Vat Gum 80 XX

For application and discharge printing of vat colors. Has necessary balance of sulphoxylates, carbonates and hygroscopic agents plus converted thickeners to assure high color value.

For test samples and additional information without obligation, write

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You'll want to crow too, if you're a Salt user, for here is a Red KB Salt stable and storable as never before.
AZOENE Fast Red KB Salt produces this old line shade with the greatest possible speed, ease and economy. Maximum fastness to peroxide, chlorine and crocking are assured. Use it for yarn dyeing, plain shades and printing.
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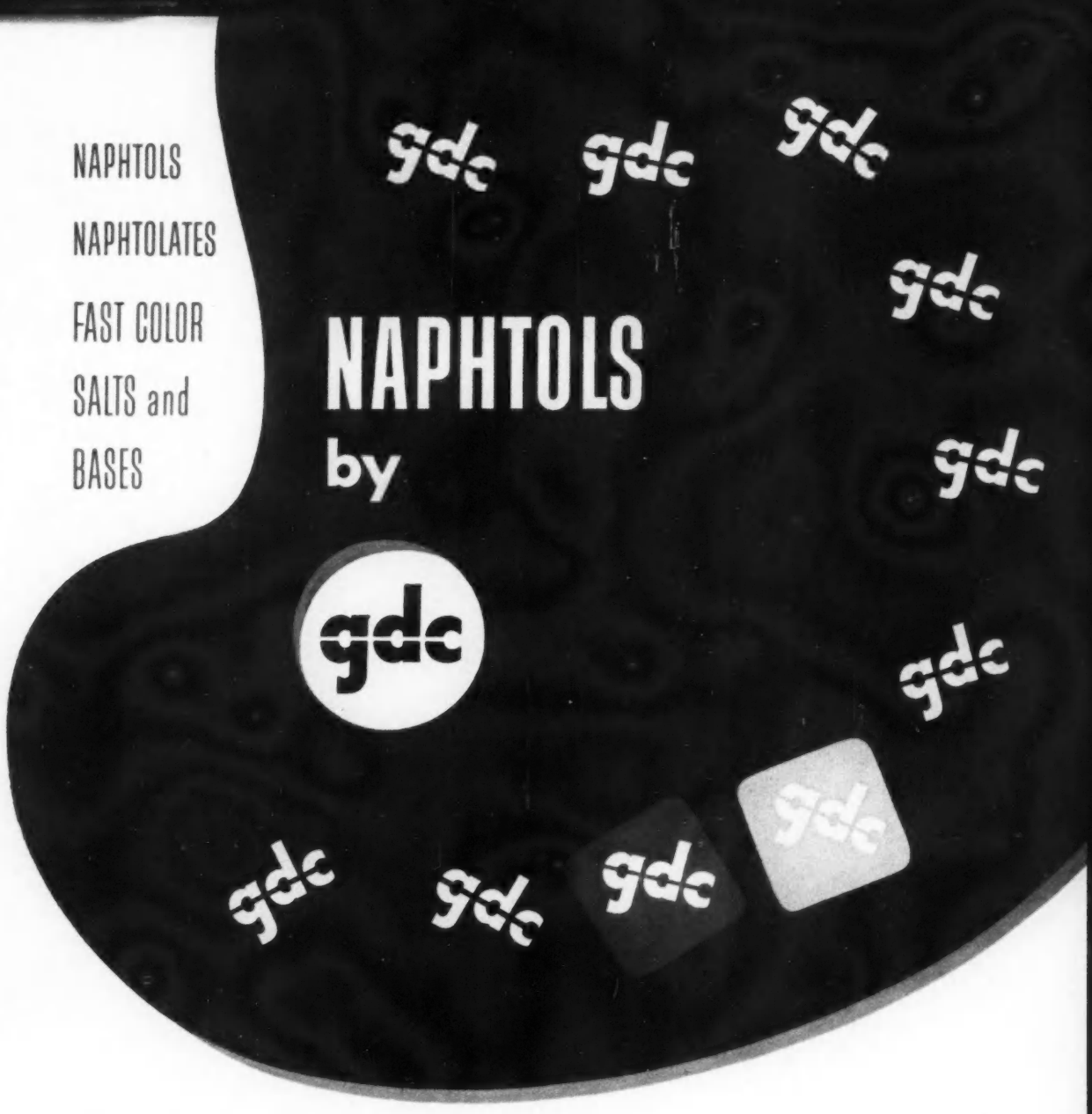
NAPHTOLATES

FAST COLOR SALTS and BASES

NAPHTOLS by gdc



Colors fast to washing . . . fast to sunlight

Whatever the volume of the dyer or printer—whatever his method—GDC offers the broadest range and the right combination of products to create the whole spectrum of fashion-right shades. These range from bright yellows and reds to rich deep wines, navies and browns. They are dependable allies in meeting today's ever-increasing demand for fast colors.

Years of manufacturing experience and extensive technical resources are continually at work for you—breeding new refinements into our products—creating new benefits to you. The Naphtols, Fast Color Salts and Bases are *now non-dusting* powders. Most of them offer greater ease of solubility and better stability in dyeing and printing, as well as in storage. These are all plus factors. For those who prefer to work with a prepared naphtol solution, we offer liquid Naphtolates.

Supporting every product we offer are the facilities—available to you—of our Technical Service Laboratories. We invite the opportunity to discuss the relative values of Naphtols and Naphtolates, Fast Color Salts and Bases—in terms of your particular requirements.

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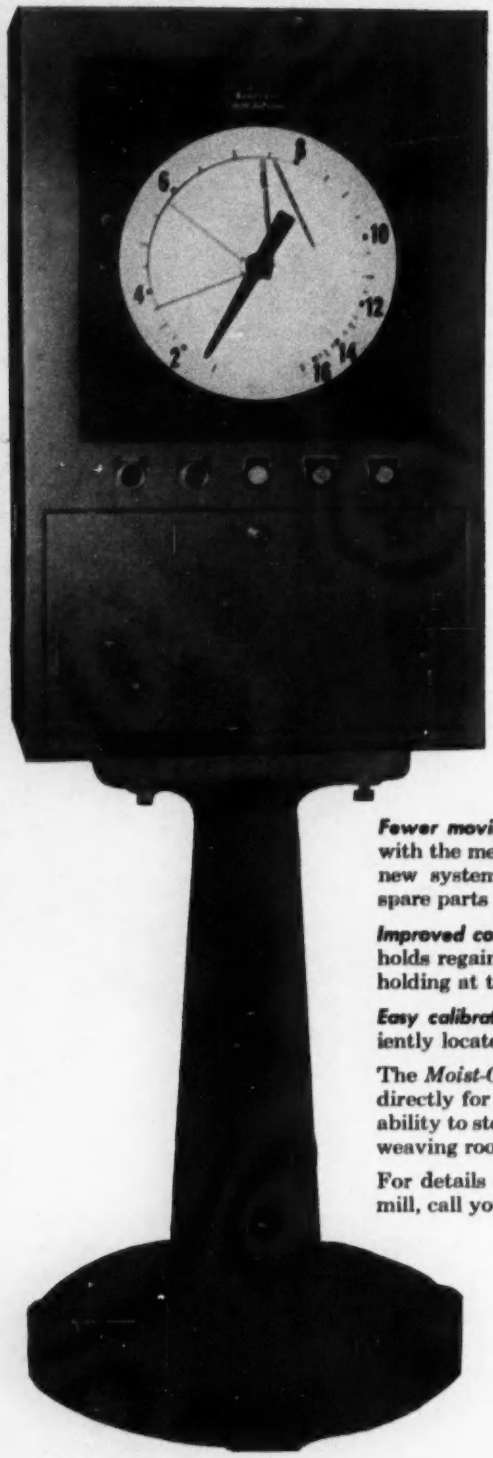

READS REGAIN DIRECTLY—CONTROLS AUTOMATICALLY. *The latest improved Moist-O-Graph can help you control the slashing operation at optimum conditions. Wet or over-dried warp is eliminated . . . weavability improved.*

Improved Moist-O-Graph®

Warp regain control is now simpler, more accurate than ever before

THE latest advances in the electronic Moist-O-Graph® bring even greater refinements in sensitivity, accuracy and simplicity to the control of warp regain. A new design, embodying the most modern engineering techniques, gives you these added features:

Fewer moving parts. Simplified design makes the instrument circuit integral with the measuring circuit . . . eliminates many mechanical components. The new system is all-electronic. It's easier to maintain, and requires less spare parts stock.

Improved control. The new circuit gives closer overall control performance . . . holds regain within narrow limits. It incorporates an automatic means for holding at the set point during creeps, stops or shutdowns.

Easy calibration. Checks of calibration can be made quickly with a conveniently located switch.

The *Moist-O-Graph* takes the guesswork out of regain control. It reads regain directly for most fibers, blends or sizes. In scores of mills, it has proved its ability to step up production and quality in the slasher room, and to increase weaving room efficiency.

For details of how this improved instrumentation can go to work in your mill, call your local Honeywell sales engineer . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

● **REFERENCE DATA:** Write for Bulletin 9306, "Instrumentation for Slasher Room Processes."

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls

Can BECCO service help you with oxidation of sulfur colors or oxidation of vat dyes?

You can ask for Becco's trained engineers and chemists to help on your dyeing range or in your laboratory.

You will find tested methods—clean, fast and simple—described in Becco bulletins on oxidation of vat dyes with hydrogen peroxide or sodium perborate; on oxidation of sulfur dyes with ammonium persulfate.

You can count on prompt delivery by tank car, truck or drum of Becco chemicals of high purity and reactive effect.

Among interesting Becco bulletins available on request are:

2. Hydrogen Peroxide
38. Oxidation of Vat Dyes on Cotton and Synthetics with Hydrogen Peroxide
45. Sodium Perborate
49. Ammonium Persulfate

Ask for Becco Bulletins by number.

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FOOD MACHINERY AND CHEMICAL CORPORATION

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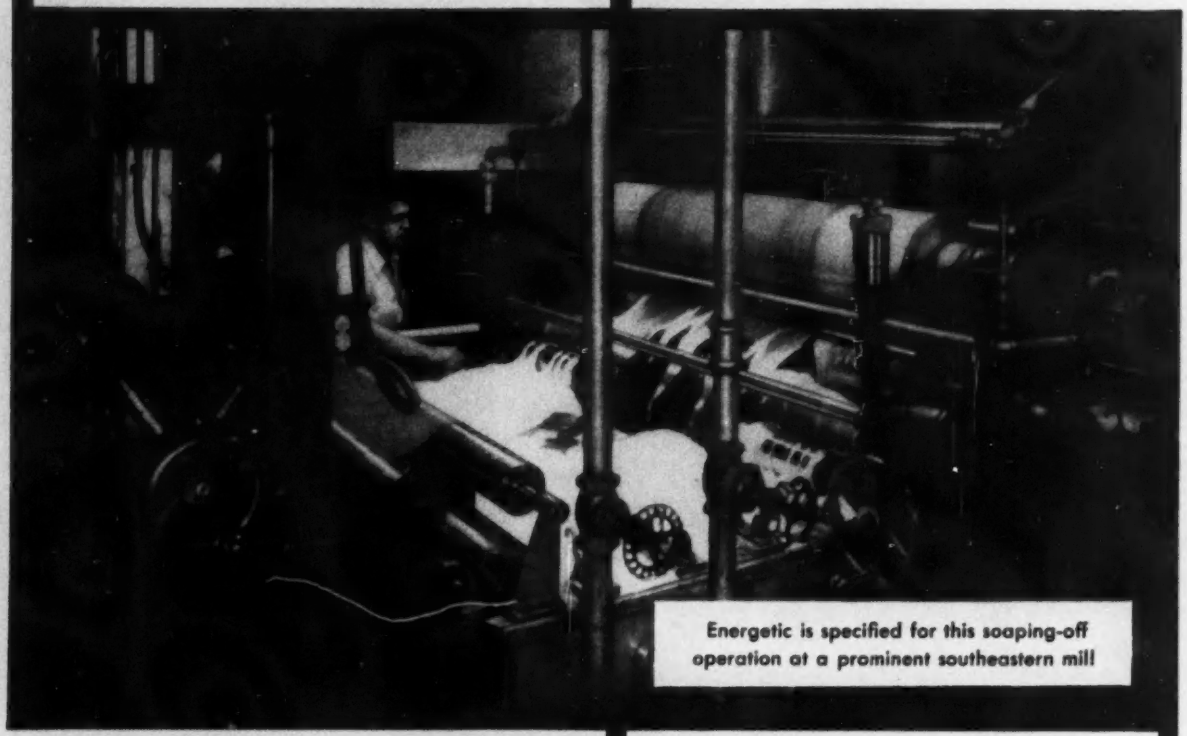
Armour Energetic* pays off where you soap-off...

with sharper, clearer prints!



Energetic is specified for this soaping-off operation at a prominent southeastern mill

Soap-off with powerful Energetic and watch the prints roll out! They'll be extra sharp and clear with clean, bright grounds—just the kind buyers want. Use Energetic for maximum detergency and economy in bleaching and dyeing processes, too. The manager of one the nation's largest mills reports that Energetic is the *only* synthetic which could solve his crocking problem on naphthol-dyed yarn.

A powerful, concentrated nonionic synthetic detergent, Energetic is supplied *90% active*—it takes only one pound to do the work of 3 full pounds of anionics. This adds up to a savings per job of about 21¢ with every pound of Energetic you use. Add builders to cut costs even more.

Send the coupon for test samples of Energetic. Or, for quick delivery on a 5-gallon trial drum, place an order in the coupon at right. And send for booklets on Energetic and its two companion products—Energetic S and Energetic W-100. All three save time, money and material!

Energetic—Versatile, economical and so efficient you need use only ½ as much as anionics for maximum detergency.

Energetic S—Designed for use with solvents—gives outstanding results in boiling off synthetic fibers, hosiery finishing and desizing cotton.

Energetic W-100—A new instant-wetting agent which speeds up wet processing all through the mill.

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it pays to go to a specialist

WHEN QUALITY DYE PERFORMANCE COUNTS, IT PAYS TO GO TO

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Leading Specialists in Dyes for Cotton — Rayon — Nylon and Other Synthetics and **blends**

For 40 years Althouse research has pioneered in raising textile industry standards of

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This record of leadership assures highest quality performance when you specify these famous, exclusive Althouse dye specialties:

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It's almost magic, the way Morton can come up with any kind of salt you need in a hurry!

There's really no trick to it. For Morton makes salt for every industrial use under the sun—canning, meat packing, freeze-proofing, water softening, brine making—to mention but a few.

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If you want the right kind of advice in planning a new brine installation for your plant, or in converting an old one, call on Morton. One of our Brine Specialists will help your engineers plan the most efficient and economical installation for your particular needs.

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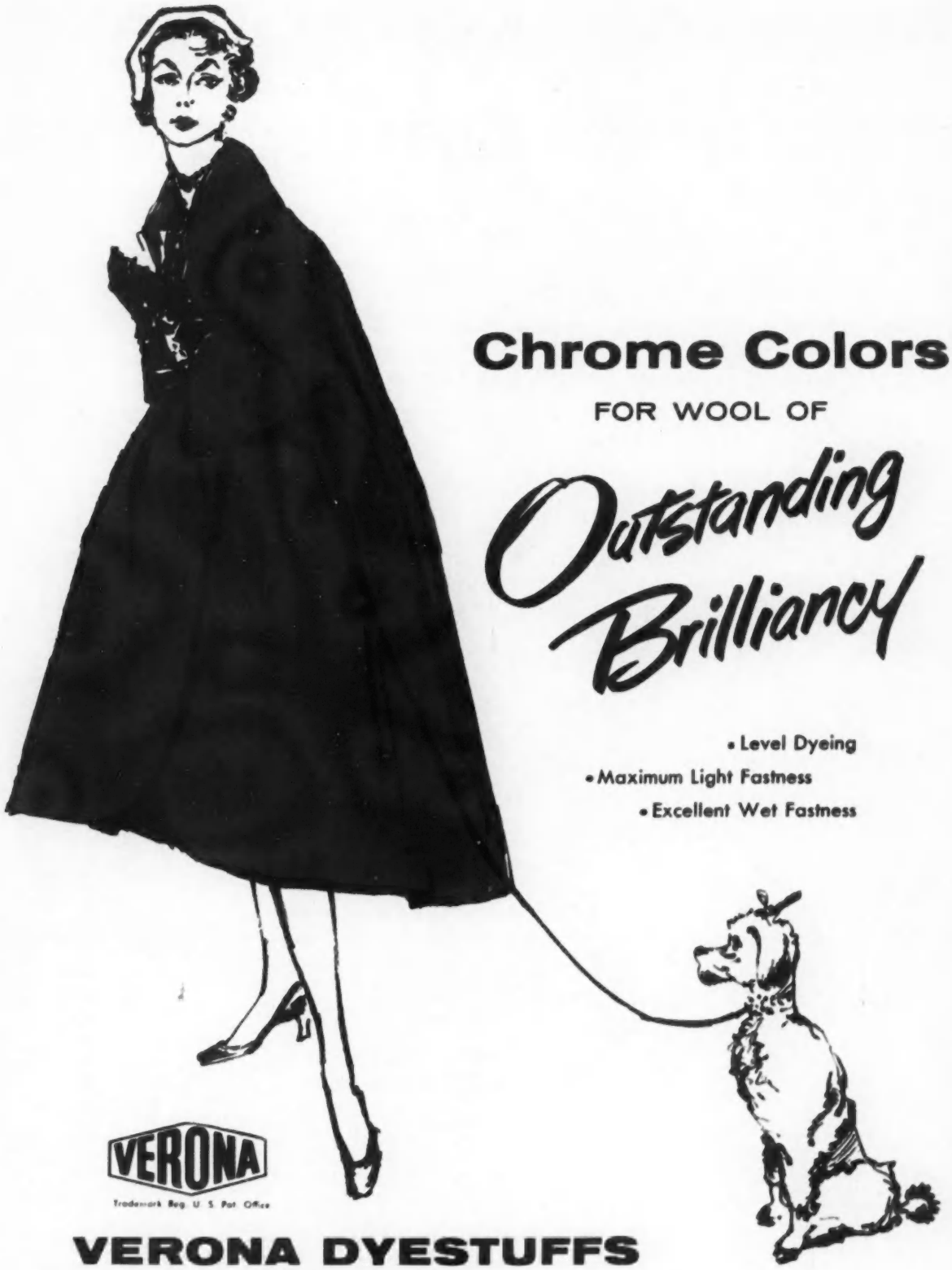

Chrome Colors

FOR WOOL OF

Outstanding Brilliancy

- Level Dyeing
- Maximum Light Fastness
- Excellent Wet Fastness

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NEUTRAL WOOL SCOURING WITH

LAVEPON WS-1*

FOR

1. **IMPROVED COLOR AND LOFT**
2. **GREATER STAPLE LENGTH**
3. **NO ALKALI DAMAGE**
4. **FASTER DRYING**
5. **HIGHER GREASE RECOVERY**

The LAVEPON WS-1 neutral scouring process has already proven highly successful on millions of pounds of apparel wools, carpet wools, pulled wools, mohair and cashmere—*at costs no more or even less than conventional alkali scours.* Why not investigate its advantages now?

* **LAVEPON WS-1** *is another dependable chemical product for the textile industry made by the makers of* LYKOPON.

LYKOPON and LAVEPON *are trade-marks, Reg. U.S. Pat. Off. and in principal foreign countries.*

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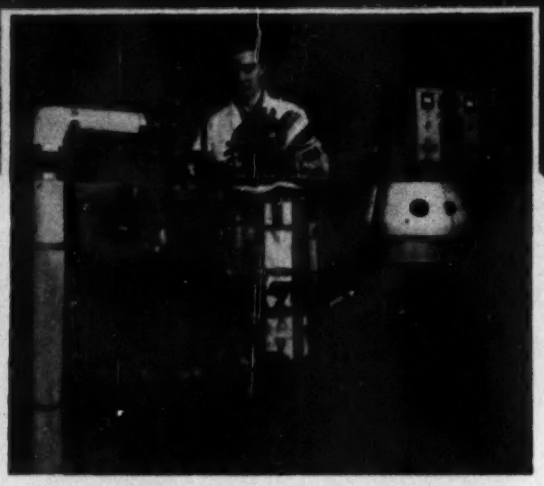
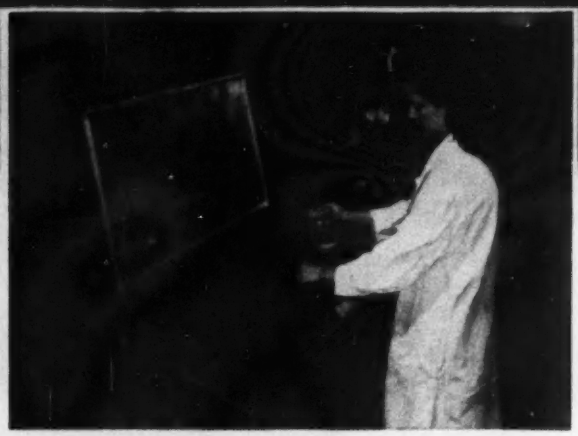
COMPLETE CUSTOMER SERVICE backs up PITTSBURGH'S BASIC DYESTUFF PRODUCTION

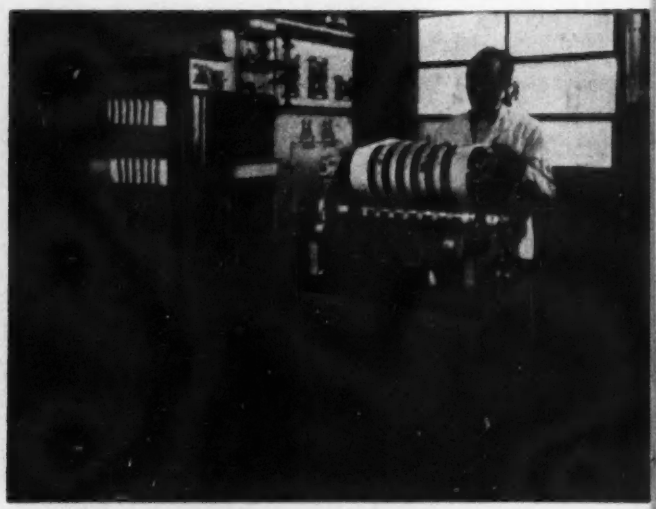


A new Customer Service Laboratory, operated by experienced personnel, stands behind every dyestuff order you place with Pittsburgh. Equipment like this pressure dyer and Fade-Ometer *guarantees* the quality made possible by Pittsburgh's coal-to-color production control.

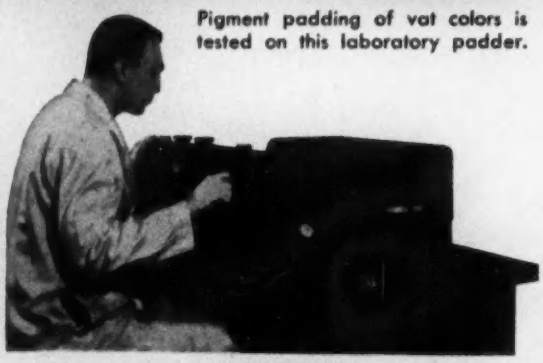


Fastness of Pittsburgh Dyestuffs to laundering is tested in laboratory in this stainless steel Launder-Ometer.

Pigment padding of vat colors is tested on this laboratory padder.



Printing and fixing characteristics of dyes are tested in printer in foreground and in vat ager in background.



A Spectrophotometer is employed in the analysis and standardization of Pittsburgh Dyestuffs.

Branch Offices: Spartanburg, S.C., Providence, R.I.
Warehouses: Charlotte, Philadelphia, Spartanburg, Providence

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scouring
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carbonizing
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bleaching
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the economical glassy phosphate for wet-processing textiles

Made wholly in Westvaco plants from basic raw materials of our own manufacture, HEXAPHOS (Sodium Hexametaphosphate) is a true glassy phosphate with superior sequestering and water-softening properties.

In many wet-processing operations, HEXAPHOS minimizes limesoap spots or other lime deposits. Its peptizing or dispersing properties are fully utilized in sizing, delustering, dyeing, and printing. And gums used in the preparation of textile printing pastes are effectively reduced to proper viscosity and smoothness with minimum amounts of HEXAPHOS.

Westvaco HEXAPHOS has a minimum P_2O_5 content of 67%, and a pH of 6.7-7.2 for maximum effectiveness as a sequestering and water-softening agent. Available in powder, fine or coarse granular, flake, and plate forms.

We would like to quote on a share of your needs and ship a trial lot so that you can judge its quality in your operations.

*Trade Mark

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INCREASE YOUR PRODUCTION by providing fast, accurate control of color processes with G-E recording spectrophotometers. A permanent record of any color is provided and formula adjustments may be easily made.

GENERAL ANILINE COLORIST SAYS . . .

"General Electric Spectrophotometers Prove Color Analysis and Duplication of

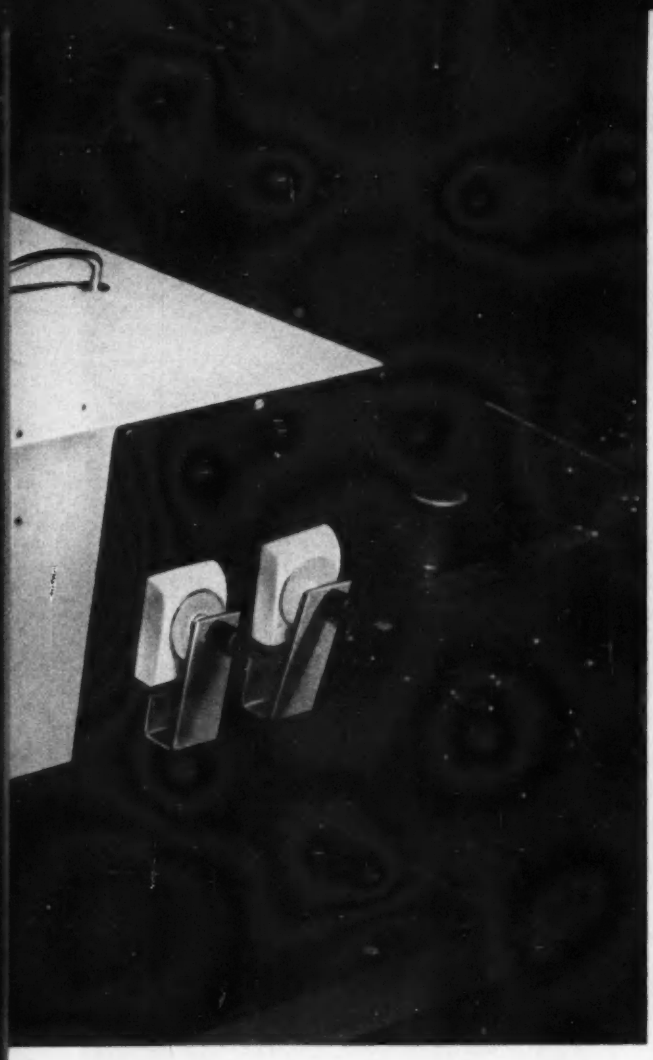
"Even the most complicated color-matching problems are taken in stride by General Electric's spectrophotometers and integrators," says Irving W. Feyler, Colorist at General Aniline & Film Corporation, Rensselaer, N. Y.

RAPID PRODUCTION-LINE ANALYSIS of dyestuffs by G-E spectrophotometers help General Aniline technicians maintain constant color control. Analysis of test sampling curves aid the colorist in matching General Aniline's standards. A complete spectrophotometric curve of the most complex dyestuffs can be drawn in only 54 seconds.

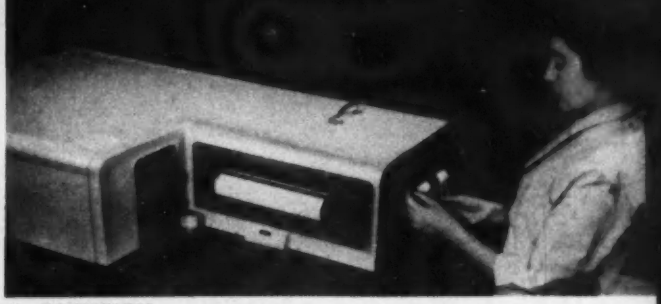
MATERIAL SAVINGS are assured because costly mismatching of dyestuffs is practically eliminated. The G-E spectrophotometer helps provide permanent color standards by furnishing a positive record of any color in quantitative terms of fundamental physical units.

POSITIVE IDENTIFICATION is provided by General Electric spectrophotometers which have a range of 380 to 700 millimicrons*. Both transparent and opaque specimens may be analyzed. The instrument is simple to operate and is used as a double-check on the judgment of the colorist when multi-color-matching problems arise.

General Aniline achieves additional savings in time by using the automatic tristimulus integrator to calculate tristimulus values. Provided as an accessory to the



THREE SIMPLE STEPS



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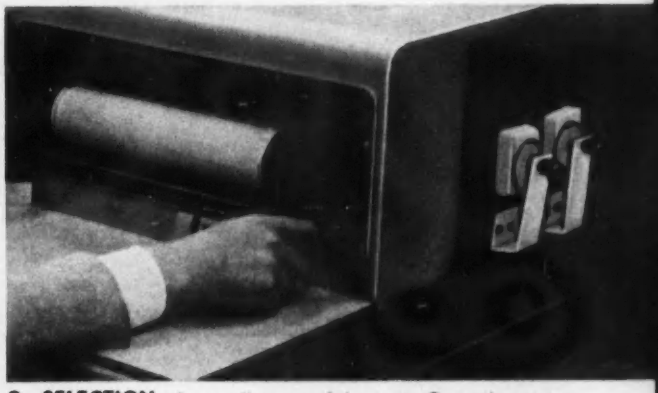

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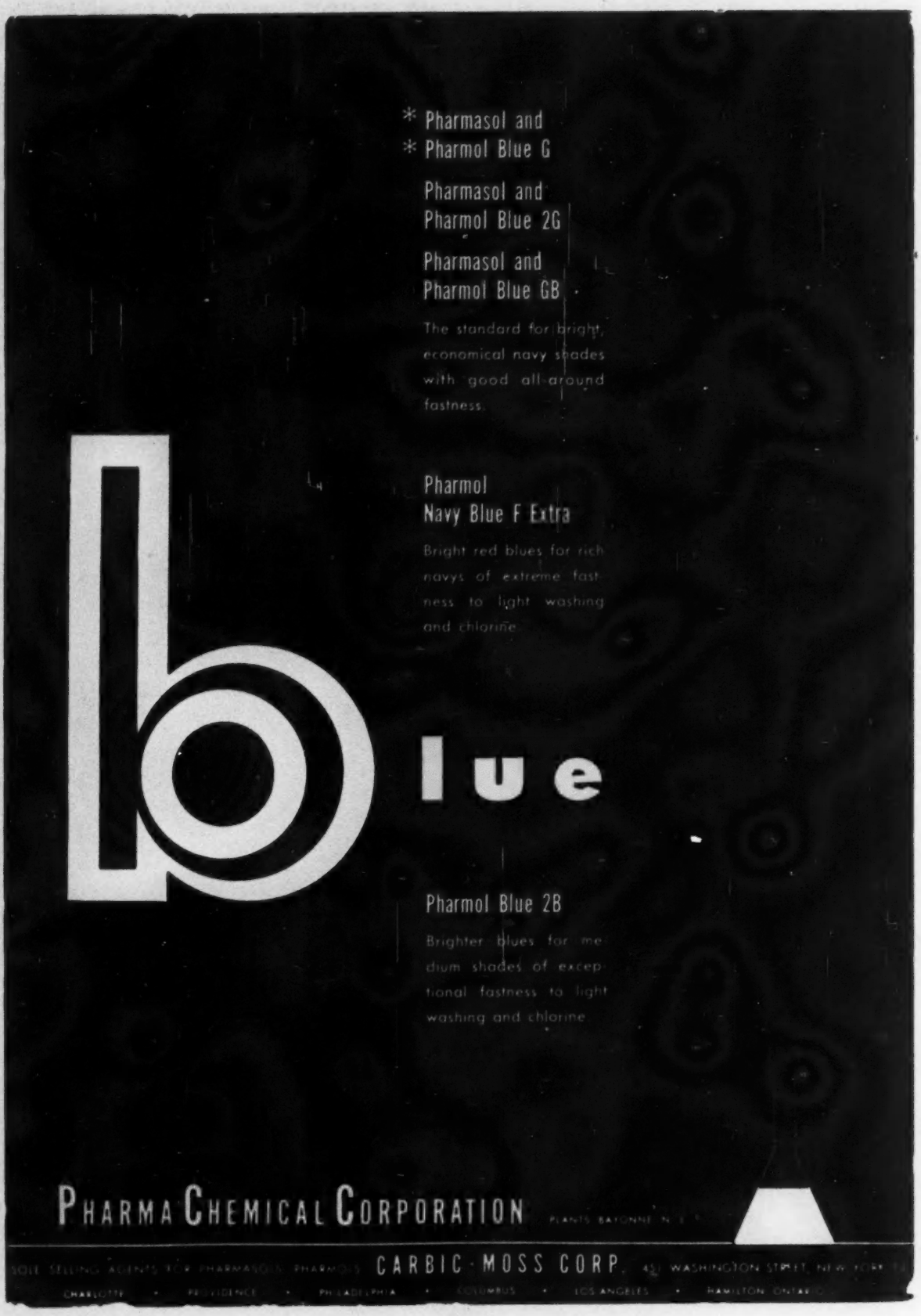
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AMERICAN DYESTUFF REPORTER

Devoted to Textile Chemistry
BLEACHING · DYEING · PRINTING · FINISHING

OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

American Dyestuff Reporter was founded in 1917 and the Textile Colorist and Converter (formerly Textile Colorist) was incorporated with it in January 1949. Published every other Monday by the HOWES PUBLISHING COMPANY, INC., 44 E. 23rd Street, New York 10, N. Y. C. R. Howes, President; Ernest J. Finan, Executive Vice President; Norman A. Johnson, Vice President & Treasurer; Myron D. Reeser, Vice President; C. Essenbreis, Secretary.

Telephone GRamercy 3-9364

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Proceedings of the

American Association of Textile Chemists and Colorists

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Editor of Proceedings: Carl Z Draves

July 18, 1955

AATCC CALENDAR

COUNCIL
Wednesday evening, Sept 21 (Chalfonte-Haddon Hall, Atlantic City, N J); Nov 18, Jan 20 (Hotel Statler, New York, N Y); Apr 20, 1956; June 15, 1956.

NATIONAL CONVENTIONS
Sept 21-24, 1955 (Chalfonte-Haddon Hall, Atlantic City, N J); 1956 (Waldorf-Astoria, New York); 1957 (Boston); 1958 (Chicago); 1959 (Washington DC)

MID-WEST SECTION
Oct 29 (Bismarck Hotel, Chicago, Ill).

NEW YORK SECTION
Oct 14, Nov 18 (Kohler's Swiss Chalet, Rochelle Park, N J); Jan 27, Feb 24 (Hotel Delmonico, New York, N Y); Mar 23, Apr 27, May 18 (Kohler's Swiss Chalet, Rochelle Park, N J).

NORTHERN NEW ENGLAND SECTION
Oct 14; Dec 9.

PACIFIC SOUTHWEST SECTION
Oct 7, Feb 6 (Gourmet Restaurant, Beverly Hills, Calif); Dec 2.

PHILADELPHIA SECTION
Oct 21 (Penn-Sherwood Hotel); Dec 2, Jan 13 (Kugler's Restaurant).

PIEDMONT SECTION
Oct 29 (Hotel Wm R Barringer, Charlotte, N C).

RHODE ISLAND SECTION
Oct 13, Dec 1 (Johnson's Hummocks, Providence).

SOUTH CENTRAL SECTION
July 29-30 (Lookout Mtn Hotel, Chattanooga, Tenn); Dec 10 (Hotel Patten, Chattanooga, Tenn).

SOUTHEASTERN SECTION
Sept 10 (Ralston Hotel, Columbus, Ga); Dec 3 (Atlanta Biltmore, Atlanta, Ga).

WESTERN NEW ENGLAND SECTION
Sept 16 (Rapp's Restaurant, Shelton, Conn); Nov 4 (Hartford, Conn); Dec 16 (Rapp's).

ACTIVITIES OF THE LOCAL SECTIONS

NIAGARA FRONTIER———Ideal weather prevailed as the Niagara Frontier Section climaxed its first year with an outing at St Catherines Golf Club, St Catherines, Ontario, on June 17th with 30 members and guests in attendance.

Winners of the golf competition were as follows: *low gross*—H J Griesinger; *low net*—S J Puliafico; *2nd low net*—E P Carney; *putting contest*—L Croce.

Prizes for the events, as well as door prizes, were awarded by Mr Puliafico, outing chairman, at dinner in the evening. After dinner, Chairman J G Kern introduced John Wallace, vice chairman of the Section and president of the Ontario Section, CATCC. Mr Wallace welcomed the group to Canada and observed that this was the first gathering of this sort to be held by the AATCC outside the United States.

* * * * * *

RHODE ISLAND———All attendance records were broken for a Rhode Island Section Outing as 365 members and guests turned out at the Pawtucket Golf Club, Pawtucket, R I, on June 10th.

Tom Larsen, Carbic Color & Chemical Co, turned in a 76 to nose out Jeff Carlson, Pioneer Finishing Co, for low gross honors in golf. Carlson shot a 37 on the back nine to record a 77. Larsen, who retired the section's trophy in 1953 after three wins, now has a second leg on the new trophy.

First low net in the tournament went to John Janket, Consolidated Bleach, with a 78-8—70, and second low net was taken by Dave Meikle, Stillwater Worsted, with a 81-10—71.

In Class B competition W Murray, Crown Chemical, copped low gross with an 84 to nose out W Gibney, Arkwright Finishing, who shot an 85. First low net was taken by Fred Grant, Crown Chemical, with a 100-30—70. Second honors for low net went to Dick England, Monsanto Chemical, with a 97-26—71.

F Kinch of Althouse took Class C low gross with a 97, while second spot went to I Laramee, Warwick Chemical, who shot 99. This division's first low net went to J Pilkington, Riveredge Printers, for his 114-42—72 and second low net was taken by Al Bouchard, Berkshire-Hathaway, with a 117-4—72.

Ralph Hawes, Apponaug Company, poled the longest drive and Ray Andrews, U S Oil Co, drove the nearest to the pin. Most fives were scored by Ralph Carlson, Pioneer Finishing, and the most sixes (11) by George Wood of Apponaug Company. Ralph Carlson also won the putting contest, with John McDermott, Springfield Corp, second. There was a three way tie for kickers, Tom Larsen, Joe Quinn, and Fred Grant, which was resolved in favor of the latter.

The outing committee was comprised of the following: *admissions*—Walter E Murray, Crown Chemical Corp; *donations*—Kenneth J Broden, Sherwin-Williams Co; *prizes*—Arthur Hustwit, Bradford Dyeing Assoc, and Earl Bush, American Aniline Products, Inc; *golf*—William A Green, Hilton-Davis Chemical Co; *dinner*—Robert Mulligan, J U Starkweather Co, Inc; *putting*—Walter Pride, Atlantic Rayon Corp; *advisory*—James Shore, Metro-Atlantic, Inc; *photography*—Kenneth C Everett, Kenyon Piece Dye Works, and John E Treszise, Onyx Oil & Chemical Co; and *publicity*—Charles F Stokes, Carbic-Moss Corp.

Membership Applications and Employment Register appear on page P493

AATCC Newsgram

July 18, 1955

CONVENTIONS

With the 1955 AATCC Convention at Atlantic City approximately two months off, no "summer hiatus" is in the offing for members of the Executive Committee for the event. (See page P502 of this issue). Messrs Traut, Steen & Co have been meeting regularly to iron out details and insure Association members and guests of a smoothly running affair. Your attention is called to "Convention Topics", a feature initiated in the July 4th issue of the Reporter. "Topics" will include items of interest relative to the Convention right up to the August 29th issue, which will give complete pre-convention coverage.

Some additional notes on the displays planned for the Dyeing and Finishing Exhibition to be held Sept 21-24 in conjunction with the Atlantic City Convention: Metro-Atlantic, Inc will show new developments in the textile auxiliary and dyestuff fields; Morningstar, Nicol, Inc will present information of the use of Solvitose HDF; International Salt Co will feature the Lixate Process and also Sterling TNA-5; Dow Corning Corp will show silicone finishes and information thereon; and Hilton-Davis Chemical Co will display its line of dyestuffs. A complete list of exhibitors will be included in the next Newsgram.

Plans for the week-long Perkin Centennial celebration, now 14 months away, are also beginning to take definite shape. At a meeting of the General Committee, held on June 27th at the Waldorf-Astoria, future site of the celebration, chairmen of the following committees gave progress reports: Exhibits, Dining and Banquet, General Program, Ladies, Entertainment, Printing, Publicity, and Registration and Reservations. The American Standards Association has joined the group of participating societies, which now numbers 26 in addition to the sponsoring AATCC. An "International Day", featuring meetings of ASA and the International Organization for Standardization, will initiate the Centennial Proceedings on Monday, September 10, 1956. The Committee plans to honor Sir Robert Robinson, one of the world's leading organic chemists and a Nobel prize winner in 1947, at that time. Sid Robert will attend the Centennial as a representative of the Society of Dyers and Colourists.

FROM THE COUNCIL CHAMBER

Highlights of last month's Council meeting included the acceptance of Washington, DC, as the site of AATCC's 1959 Convention, following an elaborate presentation by Walter M Scott, vice president (Southern Region); the acceptance of a fiscal year research budget of $6,500; the appointment of Matthew J Babey as chairman of an interim committee to establish a method for co-ordination of speakers and subjects as an assistance to local section program chairmen; the appointment of Fred V Traut as a member of the National Convention Committee, replacing the late Walter F Fancourt; and the confirmation of Charles W Dorn as a nonvoting technical advisor on AATCC test methods to the industry board on New York State flammability law regulations. Council was advised of the appointment of Dr Scott to handle the technical program for the AATCC portion of the Perkin Centennial, and the addition of William A Holst to the General Program Committee of the Centennial.

AT RESEARCH HEADQUARTERS

The second set of samples on the preliminary investigation of the Tumble Drying Project has been returned to Lowell, and each sample has been measured for shrinkage. Results have been forwarded to J F Warner, chairman of the Tumble Drying Committee for interpretation. . . . Neil Fiske has assumed his duties as a laboratory assistant at research headquarters. . . . Page proofs for Part III of the '56 Year Book have been corrected and returned for publication.

SCHOLARSHIPS

Another AATCC Section has anounced its intention to set up a scholarship fund. Chairman T Howard McCamy announces that the Southeastern Section will begin this fall a $500 annual scholarship to some worthy student either at Georgia Tech or Alabama Polytechnic Institute. Members of AATCC student chapters at these schools will be given preference. The plan, which was approved overwhelmingly by the Section, was developed by a committee consisting of Gillepsie Smith, Curt Mueller, Russell Gill and A Kempton Haynes.

Hudson-Mohawk Section——

ELECTROSTATIC CHARGES ON FABRICS*

H T McLEAN

Materials and Chemical Process Department
General Engineering Laboratory
General Electric Co, Schenectady, N Y

INTRODUCTION

THE development of synthetic fibers and the ever-increasing use of fabrics made from them have presented the textile industry with a marvelous field for exploitation. However, along with the many properties that make synthetic materials superior to natural fibers have come certain new problems, which must be solved. One of the most important of these is what to do about static electricity?

To a greater degree than the natural fibers (cotton, silk and wool), the synthetic fibers are susceptible to the formation and retention of electrostatic charges on their surfaces. These charges produce effects which are at least annoying to the producer and consumer and may even be hazardous.

Synthetic fabrics may adhere to themselves and to other materials. This is a nuisance to the fabric manufacturer and garment maker. The adhesion of the folds of a fabric brings down on their heads the wrath of both the garment designer and the ultimate consumer. Under certain conditions, sufficient charge may be built up on synthetic fabrics to cause a spark discharge, which may be merely annoying but, in an explosive atmosphere of dust or gas, is downright dangerous.

The problem has been under attack for some time. Numerous individuals and companies have been and are developing materials and methods for treating these synthetic fabrics to reduce and control electrostatic effects. Various test methods have been developed to determine the effectiveness of the treatments, but no general agreement has been reached on the value of any of the proposed methods.

This paper aims at clarification of the basic principles behind the formation of static charges and their reduction, and introduces a new test instrument. It is hoped that the information presented here will be comprehensible to the textile manufacturer and the chemical engineer developing antistatic agents, and useful to both.

H T McLean

This article is aimed at clarifying and expressing in practical terms the electrostatic phenomena observed on synthetic fabrics. The mechanisms by which fabrics become charged, the apparent location of the charges on the fabric and the common methods of charge dissipation are explained. Charge-measurement methods and the inherent errors in resistance and directional electrometer methods are discussed, and an experimental instrument based on contact with the fabric is described.

We can begin by examining the mechanism of charge formation, using the fundamental concepts of electrostatic theory and dielectric measurement as our guide.

THE FORMATION OF CHARGES

There are certain fundamental concepts, which must be kept in mind in discussing static charges.

First, the synthetic fibers are all dielectrics, or nonconductors of electricity. Secondly, charges are simply local excesses or deficiencies of electrons. An excess of electrons is termed a negative charge; a deficiency is called a positive charge. Thirdly, charges are electrostatically fixed in place on good dielectrics. Once a local excess or deficiency of electrons has been established on a good dielectric like a normal synthetic fiber in dry air, the charge tends to persist. Charges can be prevented from forming or can be dissipated by providing a path of low electrical resistance between charges, which tends to equalize the electron concentration.

It is relatively easy to locate charges on a solid homogenous dielectric sheet. Analysis of the location of charges on a fabric which consists of a very large number of fibers oriented in many planes is too difficult to attempt. A solid homogenous dielectric has a single boundary plane on each face, which plane is both a physical and an electrical boundary. In a fabric, the *dielectric* is enclosed by the complicated total surface of all the fibers, whereas the *fabric as such* is bounded by two imaginary planes — the planes that would be formed by the inner surfaces of two rigid plates in contact with the fabric.

In a thin, solid, homogenous dielectric subject to friction, each face will have a potential to other bodies. So far as another body is concerned, it will act as if its charges were all of one sign and were concentrated at an internal plane. Figure 1 represents this concept of a charged dielectric in relation to ground. In this concept, it may be considered that a potential difference V exists across the dielectric, and that the faces have potentials E_1 and E_2 with respect to ground. With respect to some internal plane of the dielectric, one face will be at a potential $-V_1$ and the other at $+V_2$ (Figure 1 is not to be understood as implying that the side nearest ground is always negative; the reverse may be true). The potential of the internal plane with respect to ground can be called E. The distance from the internal plane of the dielectric to ground = d, and the dielectric thickness = t.

The force of attraction between the dielectric and ground will be directly proportional to E and inversely proportional to d. The force between two dielectric bodies charged to different potentials E and E′ with respect to ground will depend on the difference between E and E′ and the spatial relationships of the fabrics with respect to each other and with respect to ground. If E and E′ are both considerable in magnitude but differ little from each other, and if they are at a

* Presented at the Chelsea House in Tribes Hill, N Y, on Friday evening, April 15, 1955.

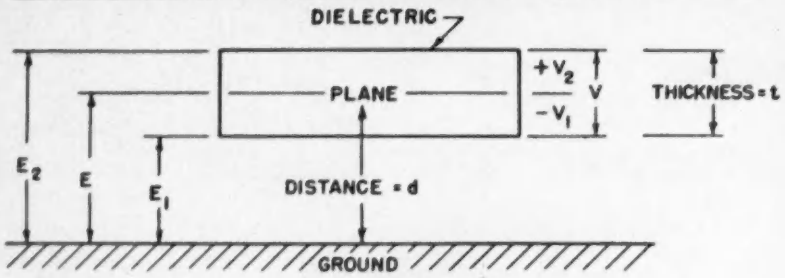

Figure 1
Potentials of a charged dielectric

distance from ground which is large compared with their thickness, the dielectrics will repel each other. Both will be attracted to ground. If E and E′ are considerably different, the bodies will attract each other and will also be attracted to ground.

We can think of a fabric as similar to a solid dielectric enclosed by the two imaginary fabric-boundary planes, but with one important difference. A fabric has many fiber surfaces, which extend between the imaginary planes. Charges exist in many planes between the imaginary boundary planes, but we can only measure and analyze the net effect of these charges at the boundary planes. We can use this concept of a fabric to explain the behavior of charged materials and the effects of antistatic measures, and to help evaluate measurement techniques.

Fabrics become charged by friction, which acts as if it adds or subtracts electrons from one imaginary boundary plane, establishing potentials E, E_1 and E_2. The rules of attraction and repulsion are the same as for a solid homogenous dielectric. The magnitude and polarity of the charge will depend on the frictioning material. The magnitude will depend also on the amount and rate of rubbing.

If the fabric is rubbed by a piece of the same material, electron transfer is not easy to predict. In some cases, there will be no appreciable net transfer to one piece or the other; in other cases there may be a net gain or loss in charge. If the fabric is rubbed by a different material, there will be a transfer of electrons in one direction. The direction and magnitude of the transfer and hence of the charge will be characteristic of the materials involved.

In the case of a single layer of fabric lying on an essentially grounded body, such as a table, any rubbing of the upper surface by a foreign material will cause the establishment of a potential E with respect to the supporting surface. The fabric will be attracted to that surface, to the frictioning body, and to all other grounded bodies, as well as to all materials having a different potential E with respect to ground. The force will be large while the fabric is in contact, since then d is very small. If the fabric is separated from contact with the supporting surface, the attraction force shows a net decrease, since this force is inversely proportional to d^2. This is partially compensated for by an increase in E as d is increased. This increase is due to the fact that there is a fixed amount of charge Q on the fabric and $E = Q/C$, where E is the voltage and C the capacitance of the space between the fabric and ground. Increasing d decreases C, thereby raising E. In this manner, large potentials can be built up between a fabric and a frictioning body when they are separated. It accounts for the shock we receive when we slide across and then leave the plastic seat covers of our automobiles, and for the cases where the incautious movement of a synthetic fabric in a hospital operating room has caused a spark to ignite an anaesthetic gas.

If two or more layers of the same fabric are involved and one surface of an outer layer is rubbed, all the layers will be attracted to each other and to the frictioning body. In this case, effective potential differences will be created between the internal planes of the layers, which result in forces of attraction. The internal planes of all the layers may be thought of as having potentials of one sign with respect to the frictioning body.

CHARGE DISSIPATION

For the purpose of understanding the action of antistatic measures, we may consider the fabric as a number of capacitors in which electricity is stored. A single layer of fabric can be represented as in Figure 2, in which, for convenience, the picture of an equivalent solid dielectric is used.

In a fabric C_1 and C_2 are the capacitances from an imaginary internal plane to the boundary planes, and C_L is the effective capacitance of the internal plane to any specified nearby object, in this case, ground. In a fabric R_1 and R_2 are the resistances of the fibers. The volume resistances of the synthetic fibers are usually very high and may be neglected. R_1 and R_2 limit the voltages V_1 and V_2 to which C_1 and C_2 can be charged.

R_L is the effective leakage resistance of the air between the fabric and ground.

Antistatic measures take one of two forms: (a) those designed to dissipate the charge with respect to other objects and (b) those designed to dissipate the charge difference between boundary planes.

The charge with respect to other objects is quite often dissipated by one of several methods which ionize the air about the fabric and thereby lower R_1, R_2 and R_L, thus limiting the voltages across C_1, C_2 and C_L.

The charges between boundary planes of a fabric are not always easily dissipated, for they often exist in locations which prevent the use of ionized air to provide lower leakage resistances, as for instance in the cases of layers of cloth in garment manufacture and of fabric folds in a

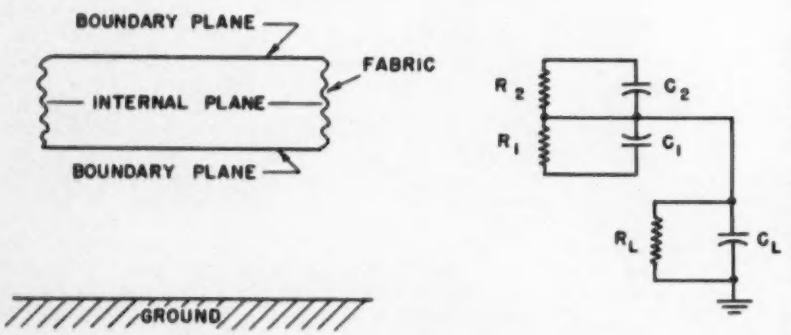

Figure 2
A charged fabric and its electrical equivalent

garment. Here, chemical treatments that produce low surface electrical resistance on the fibers are used to dissipate charges. Referring to Figure 2, such treatments lower the values of R_1 and R_2. When fabrics come into contact with other objects or with other layers of fabric, the antistatic agents also tend to reduce R_L. The total effect of reducing all these resistances is to reduce the potential differences and the attractive forces between the fabric and contacting bodies. In a continuously moving fabric, the lower resistance R_L provides a means of draining off charges to ground and thus tends to reduce these potentials.

Antistatic agents can lower surface resistance in only two ways: 1) by providing a film of inherently lower resistance, and 2) by coating the fibers with a material which attracts moisture from the air; this adsorbed water film has a lower resistance than the untreated fiber surface. However, the efficiency of these hydrophilic materials tends to decrease as humidity becomes lower. Hence, the optimum hydrophilic-type agent would seem to be the one which is the most efficient extractor and retainer of moisture. Another requisite is that the treatment withstand laundering, which may be hard to achieve with a hydrophilic material.

In any case, the basic requirements for an effective agent are 1) the lowest possible electrical resistance, and 2) the most uniform resistance over the entire fabric surface. If it were possible to enclose all the fibers of a fabric in one continuous sheath having as low a resistance as a metal and to keep this sheath unbroken under stretching and flexing, there would be no static voltage problem. The resistivities of known antistatic materials prevent us from achieving as low a resistance as the ideal sheath, but development of materials and applications methods can do much to insure continuity of the sheath and the desired uniform resistance, especially at the points of contact of the fibers and yarns.

Even when an agent produces a reasonably permanent and continuous surface film, its resistance characteristics may not be simple. Resistance paths of the type produced by antistatic agents are not as continuous as metallic resistance paths. Such nonmetallic paths tend to decrease in resistance as voltage increases. Some agents will have relatively high resistance at low static voltages and will dissipate charge poorly at such voltages, though they have low resistances at high voltages. Such agents may fail to prevent fabric adhesion, though they do prevent high-voltage sparking. Other agents have different characteristics and have low resistances at all voltages. This latter type of agent is to be preferred unless it fails in some other respect.

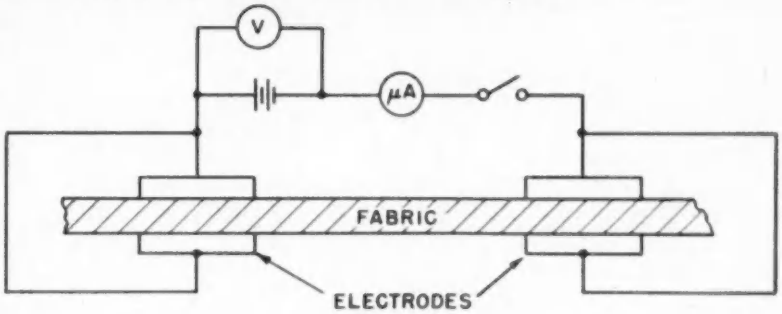

Figure 3
Resistance measurement parallel to fabric

MEASUREMENT METHODS

Since low electrical surface resistance is a prime necessity in the reduction of static electricity, it might be thought that resistance measurements would be the most direct and sure index of the effectiveness of a treating material. There are a number of reasons why this is not so.

First, the resistance between electrodes applied to a fabric is a complex quantity resulting from a network of resistors, some in parallel, some in series. These change as the fabric is flexed. In addition, there is no way of determining the distribution of resistance over the area between the electrodes.

For instance, if we apply electrodes as in Figure 3, we can measure only the total resistance between electrodes. This value can never tell us whether the surface resistance is uniformly distributed over the fabric, which condition is essential for the most effective dissipation of static charges.

On the other hand, if we apply electrodes as in Figure 4, we again can measure only the total resistance between electrodes. This resistance is composed mostly of resistances in electrical parallel. One low-resistance fiber extending between the electrodes can completely mask out the fact that the rest of the fibers have high resistances.

If resistance measurements are unreliable, then we are forced to measure the electrostatic potentials as the only other electrical quantity available. Of course, the voltages are what we are really interested in, anyhow.

One method that has been given consideration is to measure voltage with a directional electronic electrometer. These instruments measure the potential of the fabric as a whole to ground. Hence, an accurate measurement is only possible on an absolutely stationary fabric isolated from all other charged bodies. Any movement of the fabric with respect to ground after charging will change E, E_1 and E_2 even though the charges on the fabric are fixed; any stray charges from other bodies may affect the reading, because the electrometer's directional characteristics are not perfect. It must be remembered that, to an electrometer, a change in the position of a charge may appear the same as a change in the charge magnitude. Position and system geometry are all-important in such methods of measurement, and only very close control will allow reasonably reproducible measurements.

It appears that this device would tend to give variable results, difficult to interpret, when used on a moving fabric. If a fabric is stationary, it must still be rubbed before measurement to produce a charge characteristic in magnitude and

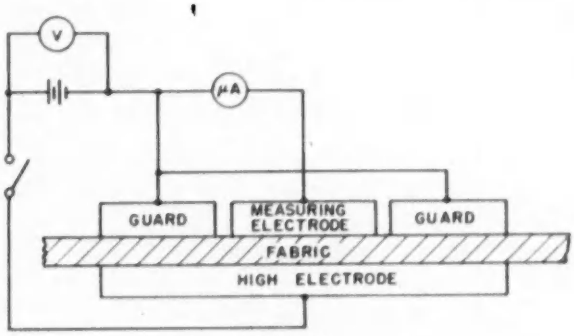

Figure 4
Resistance measurement through fabric

polarity of the fabric and the frictioning material. The removal of the frictioning material from the field prior to measurement may introduce an error into the reading. Thus, this instrument does not appear the best choice for the task.

Another method, one with which the author has had success, is to rub the fabric while it is attached to a grounded metal disk electrode, and then to bring it into contact with a second disk electrode, also grounded, but only temporarily. This second electrode is then disconnected from ground and connected to an electronic electrometer, the other side of which is grounded. The permanently grounded electrode with the attached fabric is now caused to move away from the other electrode along a line connecting the center lines of the disks at a reproducible velocity and to a fixed distance. A voltage appears on the electrode connected to the electrometer which is characteristic of the electrostatic potential produced on the cloth.

During frictioning, one boundary plane remains in contact with ground, making E_1 (of Figure 1) = O and E_2 = V. During the period when the electrodes are temporarily connected to each other and to ground, the other boundary plane is discharged, leaving only the charges between the planes.

Thus, there is a fixed charge Q between the electrode faces, and the fabric forms the dielectric of a capacitor, which has a capacitance C. By the laws of electrostatics: $V = Q/C$ where V is the voltage across the electrodes.

When the electrodes are shorted to ground momentarily, their faces contact a limited number of points on each face of the fabric and discharge these points. However, a large amount of the original charge remains on the uncontacted surfaces of the fabric. When the electrodes are separated, C is decreased, and, since $V = Q/C$ still holds, V must increase as C decreases, for Q is very little affected by the temporary short-circuiting of the electrodes. Thus, when the electrodes are separated, we get a fairly accurate, reproducible value of V, the electrode connected to the electrometer being charged by induction to this potential. Since one boundary plane is fixed at ground potential all during the test, there is no error due to fluctuation of cloth potentials to ground. No stray charges can affect the reading, since the whole electrode system and its connection to the electrometer are enclosed in a grounded metal case. Most important of all, the potential from the entire area is measured. Should there be a relatively few low resistance paths in a treated fabric, which paths do not reduce the general potential, this device ignores them and gives a more conservative picture of the value of the treatment.

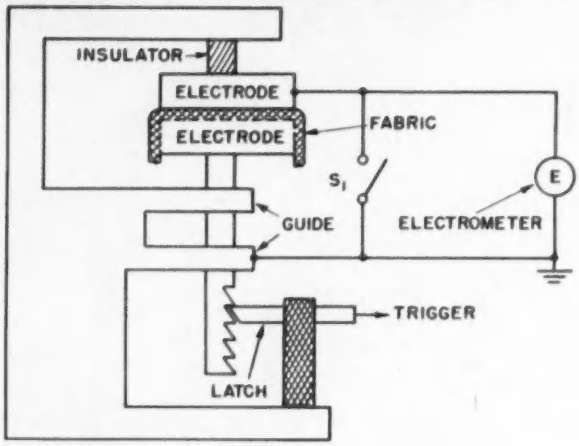

Figure 5
Schematic view of Fabric Potential Meter

A device for quickly making this measurement has been developed and is shown schematically in Figure 5 and the photograph Figure 6. It is called a Fabric Potential Meter.

The fabric is placed on the lower electrode and secured with a spring metal band about the circumference of the electrode. It is then rubbed with a piece of material chosen according to principles later explained. During the rubbing, the upper electrode is grounded through switch S_1. Then the lower electrode is raised until the fabric is firmly in contact with the upper electrode and the lower electrode assembly is latched in place. Switch S_1 is operated to connect the upper electrode to the electrometer. Tripping the trigger allows the lower electrode assembly to fall freely to a fixed distance. The maximum deflection of the electrometer is then a measure of the static voltage produced on the specimen fabric.

Initial experiments with this device proved that the previous friction history of the fabric is of paramount importance in determining the voltage measured. Even when the fabric was not deliberately rubbed, the manipulations attendant on attaching it to the lower electrode were sufficient to produce highly variable read-

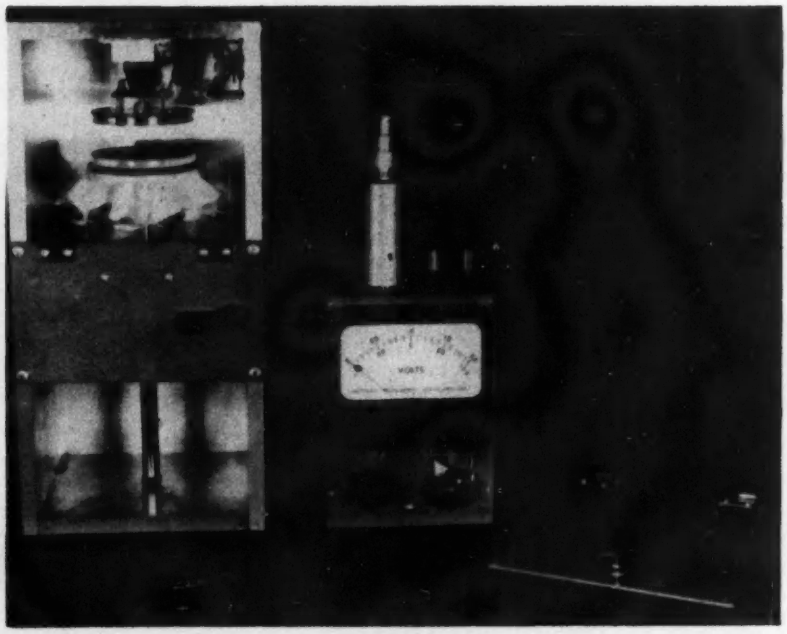

Figure 6
Fabric Potential Meter

ings when the device was tripped. To get relatively reproducible readings, it was necessary to give the fabric a definite friction history. This was done by rubbing the fabric and measuring the voltage after each measured increment of rubbing. It was found that the electrometer readings increased in one general direction and reached a maximum. In some cases, there was a reduction in electrometer deflection to zero, followed by an increase in deflection of the opposite polarity, depending on the friction history of the fabric before starting measurement.

To get reproducible readings, it is desirable to avoid rubbing a fabric with another piece of the same material. When a fabric is thus rubbed, electron transfer is equally easy in either direction between pieces, and variability is thus introduced into the charges developed on the specimen. The use of a different material establishes a fixed direction of electron transfer between pieces.

Reasonably reproducible readings can be obtained following rubbing of any fabric with whichever material gives the largest voltage. In this way the most conservative estimates of the value of antistatic treatments can be obtained, since, if they effectively reduce the largest voltage it is possible to produce on untreated fabric, they may be considered effective. Probably the best frictioning material is thin polyethylene sheet, which can be obtained in rolls and cut to a convenient size. The use of a clean piece for each test will avoid contamination of the polyethylene, especially in testing treated fabrics.

It has been found that about 25 to 50 short strokes with a piece of frictioning material held in the hand will give a maximum and reproducible electrometer reading.

Illustrative of the type of readings obtained by this method are the values obtained in Table I for one type of synthetic fabric, from enough tests to indicate the reproducibility of the results.

It will be noted that the readings in Table I were taken at 25°C and 50% RH, which are standard conditions for many electrical tests. The usual standard textile-testing atmosphere of 65% RH is too moist for significant measurement of antistatic agents. At 65% RH there is an appreciable reduction in the surface resistance of untreated fibers because of adsorbed moisture, which may give as low values as treated fibers. Even 50% RH is too moist, but was used in these measurements because it was the only standard and constant atmosphere available. Tests on antistatic agents should be done at humidities in the order of 20 to 30%. Normal differences in room temperature, except as they affect humidity, have no effect. It would be well to set up a standard of 25°C (77°F) and 25% RH for these tests.

TABLE I

Material and Conditioning	*Electrometer Reading* Volts*
Untreated fabric not deliberately frictioned	−50 to +50
Fabric rubbed 25 strokes with same fabric	−50 to +50
Fabric rubbed 25 strokes with polyethylene	−1000
Fabric treated with antistatic agent, rubbed 50 strokes with polyethylene	−10 to −20

* at 25°C and 50% RH

Consideration has been given to incorporating a means to perform the frictioning mechanically rather than by hand. While it would be more convenient, it has not been done thus far to avoid the cost increase which automaticity always brings. There is a great deal of information yet to be gained from this basic and simple device, so that it seems better to let it remain a bit primitive but versatile and inexpensive, so that it can be adapted to a wider variety of applications. Knowledge of the whole field will probably be increased more by experience with a number of the present devices than by the use of a lesser number of more complicated, costly instruments.

CONCLUSIONS

Friction charges fabrics so that they act like solid homogenous dielectrics bounded by planes of opposite polarity. With respect to other bodies they act as though the charge were all of one polarity and concentrated at an internal plane of the fabric. They are attracted to or repelled by other bodies (which may be other layers of the same fabric) according to their polarities and the potential differences between them. If two fabrics are charged to the same polarity and nearly the same potential with respect to ground, they will repel each other. If they are of opposite polarities or if there is a considerable potential difference between them, they will be attracted to each other. The polarity and magnitude of the charge produced by friction depends on the frictioning material.

A single layer of fabric will be attracted to the frictioning body and to all other bodies except another layer of the same material rubbed separately by the same body. If the top of a pile of layers is rubbed, charges are transferred through the pile and all layers are attracted to each other and to the frictioning body and to all other bodies.

Any fabric charged by friction will exhibit a potential with respect to ground as well as a potential with respect to other bodies. This potential is increased by separation of the fabric from another body. It can be reduced in some locations by ionizing the air. Where this is not feasible, as in the case of a garment being worn, the charges on the fabric can be limited by coating the fiber surfaces with a material that lowers their electrical surface resistance, such as a hydrophilic compound, which produces an adsorbed water layer of relatively lower resistance.

The effectiveness of such treatments can best be determined by using the Fabric Potential Meter described in this article. This instrument overcomes errors inherent in directional-electrometer and electrical-resistance methods for evaluating antistatic agents.

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NEW DEVELOPMENTS IN TRICOT DYEING*

L L WALMSLEY

American Viscose Corp
Marcus Hook, Pa

The development of new uses for tricot fabrics, such as wide-width draperies, automobile upholstery, and sport shirts, has fortunately increased consumption to meet greatly increased knitting facilities in this industry. The addition of nylon to the viscose and acetate formerly exclusively employed has already been an important factor in extending the market for tricot, and the present newer fibers are rapidly finding their way into this field. The Burlington dyeing machine has constituted an improvement for dyeing knit goods and is rapidly displacing less efficient rope-dyeing machines.

The latest use proposed for tricot fabrics is in the manufacture of fitted bed sheets. The author discusses rather fully the experimental work that is being conducted with respect to the choice of fibers and fiber combinations, yarn sizes, setting procedures, cutting methods, and other factors that are important for the development of superior tricot fitted sheets.

INTRODUCTION

I HAVE stated in a previous paper that because of the greatly increased number of tricot knitting machines and the resultant increased competition, tricot fabrics would have to seek new markets. It is pleasant to be able to say that this is being accomplished. Increased pressure of competition, however, is not in my opinion the main reason for the greater acceptance of tricot fabrics. What causes the public to purchase is not that fabrics are pushed at them but mainly that they have had previous satisfaction with similar fabrics.

The attitude of the tricot manufacturer, whether in knitting or finishing, has been and is one which is sure to result in increased yardage for the tricot industry. There has been open-mindedness and mutual aid in the past several years that is not often found in the textile industry. Exchanges of information and experiences are the rule and will surely result in improved fabrics. The one shortcoming in this respect is the difficulty of defining and accepting standards for the various tricot fabrics. This is being currently worked on, and in the course of the next few years should be a further stepping stone to more fabrics of a satisfactory nature from the tricot knitting machine.

The purpose of this paper is then to discuss and to invite discussion on some of the newer developments of tricot fabrics and materials, such as sport-shirt fabrics, draperies, automobile upholstery fabrics, and, in particular, the fitted sheet from the point of view of the finisher.

GENERAL REVIEW

VISCOSE AND ACETATE——It might be well to trace first the recent history of tricot finishing for the benefit of those who are not intimately connected with this field. Tricot fabrics during the past 20 years have been made almost wholly from either viscose or acetate. The finishing of these fabrics has always been basically the same: that is, tacking the edges to prevent curling, dyeing in the rope form, extracting by means of whizzing, detacking and opening followed by drying in a stretched condition to minimize the creases formed during dyeing, as well as to deliver the required yield. The resultant fabric had an appeal for certain garments, basically, women's underwear because of texture, lightness, cost, and ease of handling. Circular-knitted viscose garments of a similar nature as well as woven fabrics suffered from this competition. Acetate or viscose slips did not meet customers' requirements, primarily because of a lack of stability and, secondly, because of ironing requirements. Although many acetate slips have been made and, where care has been exercised to minimize shrinkage, have proved to be satisfactory, in the aggregate they have not enjoyed consumer popularity. Additional uses for tricot are the 75-denier dress fabric and nylon net.

These early tricot fabrics contained many creases, had very high shrinkages, and were fairly expensive to handle in finishing. The first development to improve this situation was the open-width presetting machine for acetate fabrics. This machine was developed for one reason only, to overcome the costly tacking and detacking operation previously mentioned. By this method it was possible to dye at full width without tacking, and the resultant fabric was also found to be practically free of creases. Another suggested improvement was to take the fabric off the knitting machine on a roll rather than bundling in cotton duck bags and thus to prevent creasing at the outset. The popular practice of bundling the acetate tricot in cotton-duck bags for shipment or storage is very difficult to overcome. In those plants which have changed to taking off on the roll there has been an immediate noticeable improvement in the appearance of the finished fabric.

HEAT-SETTING NYLON TRICOT——When nylon became available after the war, it began to be used in tricot in quantity. With this fiber, as is well known, it is necessary to heat set to prevent shrinkage as well as wrinkles. Various methods of setting were tried from the use of the autoclave, that is, by heat-setting with steam, including setting by means of hot air prior to dyeing and also by means of radiant heat, to which the fabric was exposed for very short periods at high temperatures up to 460°F measured on the cloth. It was found that this could be done after dyeing, and the resultant fabric was dimensionally stable during washing, the change being almost zero. All of these methods are still used, although by far the most popular is the latter. This then led to another change. Ladies' slips, which hitherto had not been popularly accepted in tricot because of insufficient shrinkage control, began to supplant the woven slip, and the French crepe slip was almost eliminated. Again, a new satisfactory garment has been added to the list of tricot accomplishments as a result of improved finishing techniques.

BURLINGTON MACHINE——The latest development in the finishing of tricot fabrics is the Burlington machine, which will soon almost eliminate the old rope-dyeing machine for large-size lots. Before being dyed the tricot fabric is passed in open width through a wetting-out tank and is wound on a perforated shell. The loaded shell, which holds approximately 700 to 1000 pounds of fabric, is placed horizontally into the

* Presented before a Symposium on Dyeing and Finishing, Group I, Knit Goods, held at the Philadelphia Textile Institute, Philadelphia, Pa, on Saturday morning, Oct 30, 1954, with Virgil T Hartquist presiding.

Burlington dyeing machine, where it fits into slots and is fastened. The dyeing machine is filled with water, and the dye is added. The temperature is then raised to about 180°F in 30-45 minutes, after which the dyeing is run for 20-30 minutes and sampled for shade. When the required shade is reached, the batch is cooled by adding cold water while circulation is maintained. When cool the bath is dropped, and the necessary finishing ingredients are added. The batch is then removed, vacuum extracted, and placed in front of the dryer for drying and setting. Most Burlington machines can operate only up to the boil, but there are high-pressure machines for dyeing at elevated temperatures, which are suitable for dyeing the newer synthetics where the designer finds them to be an advantage. The greatest advantage of the Burlington machine is that it gives an important saving in time and thus in labor cost. A further important advantage is that it leaves fabrics with a better appearance, and, in the case of acetate, improved stability, although this can easily be nullified by stretching in drying. The finishing field has thus equipped itself for future expansion of the tricot business.

NEW USES OF TRICOT———Newer uses of tricot might include acetate, viscose, and nylon sport shirts of both the jersey and stabilized-stitch type, wide-width draperies, automobile upholstery, and the fitted sheet, the last of which is the very latest thing in textiles. Sport shirts made from tricot utilizing the many new fibers have proved their satisfaction from the point of view of comfort, ease of laundering, and wear life. Further, they have an appearance value which should enable them to be sold alongside the more popular woven fabrics. Sport shirts made of all-viscose tricot or of tricot from combinations of viscose with other fibers where the viscose content is 50% or more must be chemically stabilized, as must woven viscose shirtings. And when they are stabilized, they show shrinkages of 2.0% or less if washed at the boil. More work must be done in this direction.

Acetate-tricot drapes have the advantage that they need not be pieced, they drape well and are long wearing. With the advent of the spun-dyed fiber it is felt that many combinations can be made which will give attractive patterns and be completely fast to sunlight, as well as being satisfactory in every other respect. The field of automobile upholstery makes the greatest use of spun-dyed acetate. The particular advantage of tricot over woven goods is its excellent conformation when latex backing is applied. Field tests have shown that its wear life is adequate. This end use could in itself present a large field to the tricot industry.

FITTED TRICOT SHEETS———The fitted sheet is of course quite new in the sheeting field and is basically made from cotton, as are practically all sheets. We are prone to think that, because of a very satisfactory end use by a fiber, that the public will not think of changing or at least will be loath to change. A little reflection will show us that years ago these same articles were made of linen and indeed are still popularly described as "linens." Today there are almost three hundred million pounds of cotton used in the sheeting field, and linen has about disappeared for this use. The woven fitted sheet has been accepted by the public because it is easier for the housewife to make the beds, as all is required is smoothing out, and it is said to be more comfortable for sleeping. It has been shown by past experience that, where specifications previously laid down have been met by a newer fiber, the public, because of the newness and added attraction of the new fiber, will purchase. It might be as well then to discuss what the requirements are for a sheet in general and for fitted sheets in particular.

A sheet to be satisfactory must be

1) Long wearing; the standard number of washes must be at least 100, preferably, 150. The standard sheeting wash is at 160°F with chlorine bleach.

2) Fairly stable to shrinkage, 5.0% is acceptable for nonfitted sheets.

3) Comfortable, that is, it should be smooth to the touch.

4) Easily ironed, and, preferably, it should not require ironing at all.

5) Color-fast, if dyed.

6) Competitive in price.

With respect to competitive prices, it is not too difficult to sell a new item at higher than average prices where it has certain luxury features or is packaged with sufficient glamour, but in order to sell to the large market with continuing success, the price must be competitive.

The fitted sheet, in addition to the above, specifically must keep its dimensions throughout at least 100 washings and must always fit neatly.

Let us see how a tricot-knitted sheet will fulfill these requirements. Various tests have been made of nylon and of nylon-acetate fitted sheets, and they have met all of the specifications. They have been found to launder satisfactorily up to 100 times.

They fit very well after the necessary washings and are comfortable. There are some who dislike the touch of nylon sheets or who find them too warm. Sheets of nylon and acetate in approximately 50/50 ratio are as long wearing and give the same satisfactory laundering properties. Freedom from creases is equally satisfactory for both of these types of fitted sheet. One advantage that the tricot fitted sheet has over the woven fitted sheet is that it is both lighter and more airy and as such should be easier to handle and be more comfortable. The moisture absorbency of nylon is not so good as that of cotton, but the absorbency of acetate and nylon should be sufficient. Perhaps one of the important shortcomings of the tricot sheet containing nylon is that it will turn yellow in a chlorine bleaching solution and will lose strength in continued washing. In this respect the acetate is unaffected. This disadvantage is being bypassed by suggesting that washing should be accomplished without chlorine or by offering sheets in color. From experience and practice, the users of nylon fabrics normally do not employ chlorine in washing, and perhaps it is not altogether necessary. Time will tell whether or not this is an important factor.

Viscose should not be overlooked as a factor in a consideration of fitted sheets. It has adequate tensile strength, absorbs moisture satisfactorily, and is comfortable. Ironing will not be necessary, it is more opaque, and it can be bleached without harmful effects when necessary. Viscose rayon, however, must be chemically stabilized before it can be made into a dimensionally stable fabric. Combinations of viscose and nylon are used satisfactorily where the nylon is set. At the moment very few finishing plants are equipped to stabilize viscose tricot chemically as they would require wide-width padders and curing ranges as well as washers. Furthermore, so little work has been done along this line that specifications for correct processing are not known.

EXPERIMENTAL

The field of fitted sheets in tricot is so new that very little is known of the most suitable fiber construction for this fabric, the proper finishing procedure, or the proper cutting and sewing conditions. The denier sizes most commonly used are 55-denier acetate and 15-, 20-, 30-, or 40-denier nylon. By and large, tricot fitted sheets are made with plain 2-bar jersey stitch of either all-nylon or 50/50 acetate-nylon fiber content having a yield of approximately 5.5. The reason for this is that nylon can be easily stabilized to exact dimensions, and it is not generally known that acetate can stand the heat necessary for setting nylon. In order to gain more information, the American Viscose Corporation instituted tests to determine the effect on acetate both alone and in mixtures with nylon when subjected to nylon-setting temperatures, and also to determine the suitability of these fabrics for sheetings. In addition, work

has been done and is still being done on various deniers and yarns. The initial test was made on the suitability of acetate for use in acetate-nylon combinations in order to determine whether acetate could stand the temperatures necessary for setting nylon. This test was as follows:

Five pieces of fabric of approximately 50 yards each were knitted 168 inches and were purchased from production as follows:

1) 100% 15-denier nylon
2) 100% 40-denier nylon
3) 100% 55-denier acetate
4) 51% 40-denier nylon
   49% 55-denier acetate
5) 85% 40-denier acetate
   15% 15-denier nylon

These fabrics were all prepared and processed for white.

Trial #1 consisted of drying and curing in one operation on all five fabrics to a width of 92 inches and at a curing temperature of 415°F on the fabric.

Trial #2 consisted of drying and curing in one operation all five fabrics to a width of 92 inches with a curing temperature of 370°F on the fabric.

Trial #3 was conducted on 100% acetate at a curing temperature of 400°F to a width of 110 inches.

Initial and visual inspection of these fabrics indicated that there was no degradation of the acetate at the setting temperatures employed and that all the fabrics would be suitable for commercial production. The 100%-acetate fabric cured at 110 inches at 400°F appeared somewhat firmer than those finished at a narrower width; however, on washing and redrying the softness was restored.

These fabrics were then subjected to tests for

1) whiteness
2) shrinkage
3) strength
4) degradation
5) hand
6) wrinkling during washing

The findings were as follows:

1) WHITENESS——It was noted that both the 100% 15.0-denier and the 100% 40.0-denier nylon fabrics were yellower when heat set at 410°F than when heat set at 370°F.

There was no difference in whiteness of the 100%-acetate fabric when heat set at these same temperatures.

The 85/15 acetate-nylon and the 51/49 nylon-acetate fabrics were both slightly yellower at the higher setting temperature than at the lower setting temperature.

It would appear from the above that the danger of a fabric becoming yellow (and hence not commercial) during heat setting is a nylon problem rather than an acetate problem.

2) SHRINKAGE——Slightly greater shrinkage during laundering occurred in the fabrics which had been heat set at 360°F than in those set at 410°F.

The nylon samples exhibited the least dimensional change; however, in this experiment, the shrinkage of all the fabrics is within the range of commercial acceptance.

Of particular interest was the excellent stability of the 85/15 acetate-nylon fabrics. It is believed that the construction of the fabric, eg, having the nylon on the back bar, positioned the small amount of nylon present in this fabric in such a structural fashion that the nylon contributed maximum stability.

3) STRENGTH——Within any fabric, there was no significant difference in the strength (either Ball-Burst or Mullen) whether the fabric had been set at 360 or 410°F.

As expected, the strength of the samples increased as the percentage of nylon present increased. The Ball-Burst method indicated that the strength of the 100% acetate is satisfactory. The Mullen Test also indicated that the strength of the acetate was not significantly affected by the heat-setting procedures.

Of interest, a significant increase in fabric strength was noted in the 51/49 nylon-acetate from greige to finished by both the Ball and Mullen tests.

4) DEGRADATION STUDIES——Data from the degradation studies show that neither acetate nor nylon suffers any significant molecular-weight degradation. The average basic DP of the treated and untreated acetate samples are essentially the same within experimental error. There is an indication that the 15-denier nylon sample increased slightly in molecular weight as a result of the heat treatment. Since increases in the specific viscosity of nylon when subjected to high heat is quite a common occurrence, no significance should be attached to this fact.

The heat-stability test showed essentially no change in the treated and untreated nylon samples. A slight decrease in the heat stability of the treated acetate samples was noted. However, it should be pointed out that the first discoloration point of the treated acetate samples was about the same as that of the nylon samples. Hence, from a practical viewpoint, we feel that no great damage has been done to the acetate samples by the radiant-heat operation.

5) HAND, STIFFNESS AND CRISPNESS——The 100%-acetate fabric had little or no change in hand when heat set at 360°F; however, there was a noticeable stiffening at 415°F. Again, the 100%-acetate fabric became noticeably stiffer at the higher setting temperature when set at 110 inches than when set at 92 inches.

In the opinion of some observers, the 15.0-denier 100%-nylon and the 40.0-denier 100%-nylon fabrics were very slightly crisper when set at the higher temperature.

The 51/49 nylon-acetate was slightly stiffer, while the 85/15 acetate-nylon was noticeably stiffer when set at the higher temperature.

It was the consensus of opinion that none of the fabrics changed appreciably in hand at the low setting of 360°F and that the hand of the nylon fabrics was not appreciably affected by the high setting temperature of 410°F. In contrast, the acetate was affected at the higher setting temperature, so that the more acetate in the fabric, the stiffer it became.

It is important to note that the stiffening of the acetate which occurred during the high-temperature heat setting was not permanent. Samples of the quite stiff acetate became soft and pliable after a wash in mild soap and lukewarm water followed by relaxed drying.

6) WRINKLING DURING WASHING——The fabrics can be rated in the following manner as far as resistance to wrinkling during washing is concerned:

100%, 15.0-denier nylon	excellent
100%, 40.0-denier nylon	excellent
51/49 nylon-acetate	good
85/15 acetate-nylon	fair
100% acetate	poor

The importance of the relationship between heat setting and wrinkle resistance cannot be underestimated. For example, scoured but not heat-set samples of the above five fabrics when washed gently in lukewarm water became mussed and wrinkled badly and would definitely require ironing.

Heat-setting the 15.0-denier and 40.0-denier nylons at either 360 or 410°F increased their resistance to wrinkling markedly, so that ironing would not be required.

Neither high nor low heat setting had any effect on the wrinkling during washing of the 100%-acetate fabric. All samples wrinkled badly and definitely required ironing.

The high- and low-heat-set 85/15 acetate-nylon samples were improved over the scoured sample; however, their resistance to wrinkling during washing can only be rated fair and ironing would definitely be required.

Both high and low heat setting greatly increased the wrinkle resistance during washing of the 51/49 nylon-acetate fabric over the scoured sample. The wrinkle resistance of these samples was rated as good; not so good as the 100%-nylon but much better than the 100%-acetate. While the wrinkle resistance during washing

was good, we believe that some ironing would be required on these particular samples of the 51/49 nylon-acetate fabric.

In summary, the resistance to wrinkling during washing of acetate tricot fabric is not improved by heat setting; however, nylon's wrinkle resistance is improved greatly by this operation. This limited trial indicates that at least 50% nylon is required to obtain "no ironing" possibilities. Further, when heat setting was an aid to the fabrics containing nylon, no differences in wrinkle resistance could be found between samples set at 360 and 410°F.

This in brief means that sheets from all-nylon would be satisfactory including no ironing, and, although acetate wrinkles on washing, a 50/50 fitted sheet would not require ironing. On this basis, fourteen sheets were made as follows:

6 sheets, 50/50 nylon-acetate tricot
4 sheets, 15/85 nylon-acetate tricot
1 sheet, 100%-nylon tricot
2 sheets, 100% cotton, woven

These were to be tested by giving them one hundred automatic-home-laundering and drying cycles. The following information was expected from these tests:

1) Are the sheets dimensionally stable?
2) Do they require ironing?
3) Do they maintain their fit?
4) How do the seams hold up?
5) Do they maintain their whiteness or clean look in the case of color?
6) Do they show signs of laundering, wear and tear?

The washing was conducted at 140°F and rinsing, at 100°F. The tricot sheets were dried for 20 minutes and the woven cotton sheets were dried for 30 minutes at a temperature between 110-120°F.

TABLE I

SHRINKAGE TESTS

Fiber Content %	Width %	Length %
50 acetate / 50 nylon	11.7	4.7
85 acetate / 15 nylon	5.4	8.8
100 nylon	5.6	0
100 cotton	2.4	2.0

Shrinkage figures as given in Table I indicate that better stability must be obtained, as the tricot sheets shrunk too much for good fit after washing. Further, almost all of the shrinkage was obtained after the first wash. None of the sheets required ironing, but the cotton was not as smooth as the tricot sheets.

None of the tricot sheets were opaque, but the 85/15 acetate-nylon sheets were better than the 50/50 acetate-nylon sheets, and both were better than the 100%-nylon sheet.

The 85/15 acetate-nylon developed a slight nap after one hundred washings due to broken filaments. The other tricot sheets did not show broken filaments.

The 100%-nylon sheet was the only one which showed a break in seam stitching. To summarize this work, the tricot sheets are satisfactory to normal wear life, but the shrinkage must be improved. In appearance (opaqueness) and body comfort, combinations of acetate and nylon are better than all-nylon sheets.

Since the shrinkages in width were always greater, it was felt that perhaps advantage could be taken of this, as the tricot fabric has its greatest elasticity widthwise. Should shrinkage occur, it could be pulled out to fit, and, further, some stretch or tautness might be desirable. In this respect it was decided to cut some sheets widthwise and so utilize the widthwise elasticity for the length. Some sheets were therefore cut widthwise and an equal number lengthwise on various constructions. Washing and wear tests were made and up to the present have proved conclusively that, where there is excessive lengthwise shrinkage, the sheet cut widthwise is a much better fitting sheet than one cut lengthwise. Continuing tests are being conducted on

1) widthwise cutting versus lengthwise cutting
2) various cutting methods and sizes for best fit
3) utilization of various deniers
4) combination of viscose with nylon
5) presetting in the greige followed by finishing

CONCLUSION

In conclusion, the tricot industry has at its fingertips the possibility of a much greater share of the textile industry than it has enjoyed and, what is more important, a much greater diversification of its industry. What is needed is imagination, rigid standards for each field of effort, and the resolution to put them into practice.

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55-11

Education: PhD, chemistry
Experience: research chemist, organic, physical, textile
Age: 60; single; references; presently in service of Federal Government, but available on completion of project; southeastern US preferred but not essential

7-18, 8-1

Membership Applications

June 15, 1955

SENIOR

William N Armstrong—Colorist, textile print, Associated Dye & Print Co, Paterson, N J (NY). Sponsors: R B Simon, E P James.

Herman H Croland—Sec'y-treas, Associated Dye & Print Co, Paterson, N J (NY). Sponsor: R B Simon, E P James.

Ernest A Glaus—Finisher, Associated Dye & Print Co, Paterson, N J (NY). Sponsors: R B Simon, E P James.

John L Harlow—Asst to president, Bellman Brook Bleachery, Fairview, N J (NY). Sponsors: J L Hart, L J Kelly.

Joseph L A Morin—Dyer, Guilford Woolen Mills, Guilford, Me (NNE). Sponsors: N E Perra, T P Seney.

Cecil A Robinson—Supervisor of dye & bleaching, Anniston Knitting Co, Anniston, Ala (SE). Sponsors: A K Haynes, N Johnston.

Henry I Spence—Foreman, Testing Dept, Coats and Clark, Inc, Albany, Ga (SE). Sponsors: R B Hallowell, R H Dickinson.

Andrew C Stevenson—Asst colorist, textile print, Associated Dye & Print Co, Paterson, N J (NY). Sponsors: R B Simon, E P James.

JUNIOR

Frank N Handal—Trainee, Ciba Co, Inc, New York, N Y (NY). Sponsors: E P Ward, D Cook.

ASSOCIATE

Wayne A Elliott—Salesman, General Chemical Div, Allied Chemical & Dye Corp, Philadelphia, Pa (Phil).

Charles L McDaniel—Dyer and dyehouse foreman, Oakdale Cotton Mills, Jamestown, N C (Pied). Sponsors: R H Smith, L W Stevens.

STUDENT

Frederick W Wilson—Lowell Technological Institute. Sponsor: G R Griffin.

CORPORATE

Pellon Corp

Philadelphia Section——

COMMENTS ON PACKAGE-DYEING MACHINES*

A P MARCH

Smith-Drum & Co
Philadelphia

A machinery manufacturer makes some comments on the manufacture and use of package-dyeing machines. Kier corrosion is aggravated by high temperatures, various electrolytes, and rapid changes in temperature. He especially gives advice on the corrosion problem and emphasizes the importance of the use of the latest stainless steel. The use of carriers increases the versatility of package machines, and the use of control panels reduces costs and promotes uniformity of processing.

MATERIALS OF CONSTRUCTION ——Everyone in this audience is familar with the natural course of development of materials for the construction of dyeing machinery from wood to iron to copper to Monel to stainless steel to stainless steel 316 ELC (extra low carbon). For all these materials the finish of surfaces is most important. In our experience we have found that the smoother the surface, the less chance of corrosion on *any* type of stainless steel. Even common salt will attack stainless steel, and we continue to urge cleanliness and proper maintenance of these expensive pieces of equipment. Neglect will only lead to unsatisfactory performance of equipment and replacement.

For the avoidance of corrosion at the welds of stainless-steel equipment, steel suppliers are now furnishing us stainless steel 304 ELC and 316 ELC. Such corrosion can be a very serious source of trouble. Poor welds often lead to corrosion, cracks, leakage, and eventual disintegration of equipment. Replacement is then a consequent, final result. The constant, rapid change of temperature used in processing is a contributing factor to corrosion at the welds. It would be well to consider this in replacing existing equipment or installing new machines.

CONTROLS ——— Auxiliary equipment on a package dyeing machine usually means an automatic control panel, which can be as elaborate as the particular situation requires. The simplest form of this is an automatic temperature and reversal control. A more elaborate arrangement could include automatic cooling and pressure control, along with flow process. Included in every control panel is a pressure gauge, which measures the resistance of the material being dyed to the flow of the dye liquor. Excessively high or low pressure readings indicate either low flow or channeling, which will lead to uneveness; and extra high pressure will also indicate packages wound too tightly. Uniformity of dyeing depends to the greatest extent on the uniformity of winding from package to package, as well as from lot to lot. The best package dyer cannot possibly produce satisfactory results without uniformity of physical properties in his packages.

PUMPS———The most controversial aspect of package dyeing has always been the rate of flow per package. We have found that, with proper formulation and chemical control, machines with what is now considered inadequate flow can produce the highest quality results. I refer particularly to vat colors and naphthols on cotton yarn dyed on ⅜" tubes or Barber-Colman cheeses. We recognize that the difficulty of this type of dyeing is minimized by the use of pumps properly powered for higher flow. However, most old equipment can be adapted to the higher flows now prevalent in new equipment. Investment in higher pumping capacities does not necessarily relieve the dyer from chemical adjustments.

CARRIERS———One of the best features of the package-dyeing machine is its versatility. Carriers may be supplied to accommodate all types of packages, tops, tapes, warps, raw stock, rayon cakes, mock cakes of various materials, and almost any type of textile material. We have also found that piece goods of certain constructions may be processed in package dyeing equipment.

Of great interest to the industry is the acetylation and cyanoethylation of cotton, which are being carried out in modified package machines. Since the equipment is adaptable to a closed, closely controlled process, the potential appears unlimited. As a consequence, package-dyeing equipment is not the highly specialized equipment most people think it is.

HEATING, COOLING———The heating of dyehouse vessels has long been of great importance and has been a maintenance problem in even the most particular of dyehouses. The next development was the use of jackets on either piping or dye kiers. This system proved inadequate when compared with the use of heat exchangers for rapid heating and cooling. This point should be of tremendous interest to any processor of textile materials. This system, with its feature of cooling as well as heating, is the newest tool of the textile chemist and dyers. It is of the utmost importance to the Industry to have this valuable means of processing at its disposal.

According to the newest literature, technics have been developed which require this type of control. We refer specifically to a paper by Fox *(1)*, which specified that vat colors on cotton should be applied at initial temperatures of 280°F and cooled to the optimum, money-value temperature to eliminate crossovers and to complete exhaustion of color from the bath.

Arrangements are now being made to make the Steverlynck system for high-temperature pumping control available in this country. This will be especially valuable for the maintenance of pump flow in circulating machines during the cooling of circulating liquor.

We have been able, through the use of heat exchangers, to provide facilities for this type of operation, which we believe to be the greatest advance in dyeing technics in many years. This system enables the chemist and dyer to control his processes far beyond the limitations that existed until a short time ago in that the cooling procedure was achieved only by radiation. It is true that some machines

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* Presented before a Symposium on Dyeing and Finishing, Group II, Yarns, held at the Philadelphia Textile Institute in Philadelphia, Pa on Saturday morning, Oct 30, 1954, with Frederick V Traut presiding.

Philadelphia Section——

SOME MECHANICAL IMPROVEMENTS FOR DYEING AND FINISHING*

HARRY CREEGAN
James Hunter Machinery Co
North Adams, Mass

A representative of the dyeing-machinery manufacturing industry tells about some of the new developments that his firm is bringing to dyeing and finishing with special emphasis on equipment for improving both quality and efficiency. Continuous cloth washers for worsteds and woolens are described that have the advantages of greater simplicity and lower installation cost. The Vapojet System of drying makes use of superheated steam at high velocity applied from close nozzles to attain drying in piece goods with greater efficiency and better preservation of fiber quality, and without migration of resin monomers or dyes. Eicken-System Hygrometers and Psychrometers permit automatic control and recording of the moisture content of fabrics. The report concludes with an account of the experiments by which the Du Pont Barotor high-pressure dyeing machine for piece goods has been made practical and efficient.

INTRODUCTION

I WON'T try to run through the gamut of all the dyeing and finishing machines that might be discussed within the confines of this title. The variety of machines and combinations of machines that could be discussed are almost infinite. I will confine my remarks to a few of the newer developments with which we are most familiar, and discuss them in some detail.

While we will be discussing individual machines, we must not lose sight of today's trend to continuous processing. This trend became firmly established in the thirties and has continued ever since. It is represented by continuous vat dyeing in the cotton and rayon field (pad-steam, Williams unit, etc), by continuous bleaching in the cotton field, and continuous cloth washing in the woolen and worsted field. It is appropriate to begin our discussion of new developments in the field of continuous processing.

NEW MACHINERY DEVELOPMENTS

CONTINUOUS CLOTH WASHERS ——Continuous cloth washing has always been considered desirable in the woolen and worsted fields. Machines for this purpose have been on the market for some time. They consist of a series of regular cloth washers running in tandem and fitted with a suitable range drive to control the speed of individual units.

The newest design of continuous cloth washers, introduced by James Hunter, accomplishes the same result at considerable savings in installation cost. This is accomplished by using a 3-roll squeezer placed over two vessels which are self-supporting and placed in a pit by the customer. By threading through the lower nip for the first vessel and the upper nip for the second vessel, one set of squeeze rolls is eliminated. Four of these two-vessel units will therefore do the work of the normal eight-vessel continuous cloth washer.

Further savings are effected by means of a simplified drive. The transfer strand between each unit is allowed to form a loop of 25 yards, and, since all rolls run at the same peripheral speed, no dance roll or variable-speed drive is necessary. Ordinary AC motors can be used at less cost than DC motors and controls.

The vessels are set flush with the floor. The framework is therefore only that required for the squeeze rolls, which are supported by the floor. No supports are necessary for the vessels, since they do not support reels or squeeze rolls.

The cost of this system of continuous cloth washing is almost one-half that of the conventional type. All of the advantages of continuous cloth washing are realized at a lower initial investment, with some additional advantages. Since the vessels can be set closely together, counterflow can be obtained without costly pumping systems. Also, the system uses approximately one-half the floor space of conventional systems.

VAPOJET DRYING——In the drying field, the Vapojet System of drying is of interest *(1)*. This system utilizes superheated steam at high velocity to provide highly efficient drying. Although superheated steam is not new as a drying medium, the Vapojet System successfully combines the use of superheated steam with high-velocity impingement on the cloth from nozzles located only ¼" from the cloth surface.

The Vapojet Dryer is at its best when there is a special drying job to be done, where migration must be eliminated, or where there is a scarcity of floor space to install a dryer. Not every drying problem can be solved with a Vapojet Dryer, but it should always be considered where new dryers are contemplated or a special problem presents itself.

EICKEN-SYSTEM INSTRUMENTS ——A new and important development in the instrument field is the Eicken-System Psychrometers and Hygrometers *(1)* now being manufactured by Hunter Controls, Incorporatetd, a wholly owned subsidiary of the James Hunter Machinery Company. These instruments, shown for the first time in this country at Atlantic City in April of 1954, allow the measurement of moisture in either an atmosphere or in webs under conditions never before possible.

We recently installed one of the Eicken-system Hygrometers on a raw-wool-stock dryer in North Adams. By controlling the humidity at 45%, we were able to dry at 190°F, whereas 230°F was the normal temperature for drying this particular grade of wool.

BAROTOR——Of vital interest to today's dyer is the Barotor *(1-5)*, introduced to the trade and developed by DuPont. Designed primarily to provide a means of dyeing fabrics at temperatures above the boil, the inventor of the Barotor also tried to meet a variety of requirements, such as the tensionless, full-width processing of fabrics, low dye-liquor ratios, and even exposure of each yard of fabric to the dye liquor. How well the Barotor meets these specifications is only now becoming apparent.

* Presented before the Symposium on Dyeing and Finishing, Group III, Woven Fabrics, held at the Philadelphia Textile Institute in Germantown, Philadelphia, on Saturday morning, Oct 30, 1954, with Arthur W Etchells presiding.

Fabrics are dyed in layers, the number of layers being determined by the weight and construction of the fabric. If the familiar parallel loading system is used, piece lengths must be carefully controlled. If the newer series system of loading is used, piece lengths may be as received, and only the total yardage of fabric in each load is controlled.

In order to study the mechanical aspects of the operation of the Barotor, the James Hunter Machine Company built an open tank. A rotor was mounted over and in this tank in the same relationship as existed in the Barotor. This work and study, together with the observation of mill installations and the recommendations of mill people, have led to a number of significant improvements in the design and construction of the Barotor.

The original concept of the Barotor made provision for progression of the fabric to avoid bar marks. Practical mill trials had shown that the degree of this progression was important to the evenness of dyeing between layers of fabric. For this reason, the outer bars on the rotor were provided with Teflon bearings to make them free turning. Subsequent trials further confirmed the desirability of maximum progression, and Teflon bearings were added to the inner bars.

Trials in the open tank showed that, while the fabric progressed in the direction of rotor travel, just after each loop left the surface of the liquor, a marked regression occurred after the fabric rotated to a point above the liquor surface. This observation led to the addition of a ratcheting device on each outer bar (patents applied for). An increase of over 300% in progression was obtained. Subsequent mill trials definitely proved that this increase in progression not only eliminated shading between layers, but allowed additional layers to be dyed without difficulty.

Turning our attention to the problem of loading we realized early in the practical development of the Barotor that automatic loading would be desirable. Today this is an accomplished fact. James Hunter has installed an automatic loading device in the South, which is now operating successfully.

Aside from the slight saving in manpower, the autoloader is important because of the control of loading conditions which it offers. In loading the Barotor, it is necessary to overfeed each loop slightly to allow for shrinkage during the process. The autoloader does this precisely, eliminating the guesswork necessary in loading by hand. A more even distribution of fabric results, which further encourages levelness of dyeing.

Probably the final major step in the development of the Barotor design has now been taken. James Hunter is now offering a remote loading system, whereby a rotor can be loaded with fabric in a special loading area while another loaded rotor is being dyed in the autoclave. Furthermore, for mills who may wish to start out with only one autoclave and rotor, our present conventional design can be readily converted to the remote loading system. It has been estimated that this remote loading system will reduce the total dyeing cycle, including loading and unloading, by almost one-half. Production can therefore be doubled over present systems by the addition of a loading station and additional rotors. Since the autoclave is by far the most costly part of the Barotor, this system offers a double economic advantage.

A final word about the Barotor. We at James Hunter are now confident that the Barotor will have many applications as a dyeing machine, other than the obvious one of dyeing synthetics at high temperature. Unless you have seen it, you cannot imagine the terrific interchange of dye liquor that occurs, nor the degree to which the dye liquor passes through the fabric. The fact that the fabric is in open width is an obvious asset to the appearance of the finished fabric. DuPont has now announced a process for the dyeing of Dacron and wool blends without damage to the wool. Acetate sharkskins have been dyed on the Barotor with complete penetration and levelness in four hours. Anyone who has tried to do this on the jig will realize the advantage. I am sure you will hear a great deal more about the Barotor.

CONCLUSION

Dyeing and finishing machinery has undergone many changes in the last fifty years. Many new processes and machines have been added to the list required for successful processing. It is probable, however, that we will see more mechanical improvements and advancements in the next ten years than have occurred in the last fifty. Machinery companies are devoting more and more time and money to development programs. To be successful, however, these programs must be carried out with the full co-operation of the mills. We have an awful lot to learn in the machinery field, and look to industry and associations, such as AATCC, to help us acquire this knowledge.

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Package-Dyeing Machines———

(Concluded from page P494)

were built with jacketed kiers, which gave control to a degree, but basic engineering principles illustrate that the jacketed method is less efficient or practical mechanically than a heat exchanger.

The heat exchanger is an apparatus through which a portion of the dye liquor flows, actuated by the pump on the main circuit of the dyeing machine, which permits a portion of the dye liquor to be thermostatically controlled without the introduction of condensate to the dye bath. Rapid rise and fall of temperature are possible but are controllable, so that a wide variation in rate of rise or rate of depression is available.

The use of this type of heating eliminates the possibility of the full pressure of the boiler being delivered into the dye kier through open steam lines and eliminates dilution of the bath through condensation of steam in the dye liquor. This new method of temperature control will be of extreme value to the chemist and dyer in the new processes that are currently being advocated. While present technics do not call for temperatures as high as 325°F, machines are available to operate at this temperature.

CONCLUSION

Our industry is prepared to co-operate fully with the dyestuff chemist and the dyeing industry as a whole to furnish equipment for any special needs that may develop, which may include such special processes as the acetylation or cyanoethylation of cotton fibers.

The processing of synthetics is still in its early stages. Regarding thermal stabilization, we feel that, with the co-operation of the winding equipment manufacturers, fiber manufacturers, and most of all the processors, many existing problems will be solved.

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Philadelphia Section——

STOCK DYEING*

JACKSON BAUER

Fred Whitaker Co
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Although piece dyeing has the advantages over yarn dyeing, and even to a greater extent over stock dyeing, of permitting delay in the selection of shades to the last moment and the maintenance of smaller inventories, it makes dyeing easier in many respects. Better penetration, greater uniformity over large production in spite of variations in stock, the elimination of redyes, the attainment of heathery novelty effects, more exact matching of specified shades, less fiber damage, lower dyeing costs, the use of unlevel-dyeing colors, the elimination of fiber shrinkage, and greater ease of dyeing under pressure are some of the many advantages of stock dyeing over the dyeing of textiles in later stages of manufacture. Stock dyeing offers problems also, however, including especially sampling and blending. The author discusses not only these problems but particularly stock dyeing under pressure.

GENERAL ASPECTS

OF the three basic forms in which textiles are ordinarily dyed——stock, yarn, and piece goods——perhaps less has been said about stock dyeing than the other two. While the dyeing of piece goods delays the matter of shade selection and dyed inventory to the last possible moment, this type of dyeing is not without its problems. If a piece is dyed unlevely, there is no alternative to either obtaining leveling by some devious means or of redyeing, possibly after stripping, for the finished piece of goods has much more value than the same amount of fiber at an earlier stage of manufacture. Something of the same problem exists in yarn dyeing, for if a dyelot should contain yarn from different origins or otherwise different sources, the dyer has a real problem on his hands. Additives such as oil, surface-active agents, antistatic agents, etc, often add to these problems.

How can the correct average shade be determined when a number of individual dyeings comprise a lot?

Stock dyeing works out best when sizeable production is involved. Under such conditions it is the general practice to approximate the correct shade in the first load by use of a laboratory-developed formula. The dyer is then in a position to make such adjustments as may be necessary to throw the shade to an extent that the average between the first two lots will approach the shade of the matching sample. If a lot of, say, 30,000 lb is to be dyed in 1,000-lb lots, the dyer has thirty opportunities to make shade correction. Because thirty lots present a problem in accurate sampling to obtain the correct average shade, this feature must be given careful consideration. Various sampling procedures are used and perhaps the poorest of these is to attempt to sample the dye load by hand. Because of lot-to-lot variations, serious mistakes in judgment can result from such procedures. In wider use is the "sandwich blend" where the first dye load is spread over a bin floor and successive loads are spread over the same area. In this way, when the complete blend is laid, a vertical cut from the blend may give a good representation of the average shade.

An improved method of sampling developed several years ago at the Fred Whitaker Company involves the use of the core-boring tool. This method of sampling has been used by Government and private agencies for a number of years in the determination of the clean wool fiber present in a lot of grease wool and is described by the ASTM *(1)*. This method of sampling has also shown promise in representing a lot of fiber for such characteristics as fiber diameter, vegetable or other foreign matter, moisture, etc. In coring for shade many of the same problems exist as are common to other methods of sampling. The lot of dyed stock is baled and cored in the direction of compression. These cores are then mixed and run together on a sample card. The sample card should be a modern one, large enough to handle rapidly the combined corings. Metallic wire cards are best for this purpose as they are largely self-cleaning and do not require the addition of oil to the stock, which may somewhat affect the shade of the carded fiber and interfere with color matching. The carded stock may be spun either by hand or on a small spinning frame if a yarn sample has been supplied for matching or, in the case of pile fabrics, a small "pom" may be made to observe the shade effect from the direction of the ends of the fibers. For some purposes it is better to match the shade in flat form, and for this purpose the carded stock may be made into a pad on a small Abbott fulling machine.

Why stock-dye instead of at a later stage in manufacture?

1) Perhaps uniformity is among the most compelling reasons for dyeing textiles in stock form. This is not to say that stock-dyed loads are always even. On the contrary, level dyeing is just as much a problem in stock dyeing as in yarn or piece dyeing. The fact is that a certain amount of unlevelness in any given load can be tolerated as long as this does not affect adversely the shade of the final blended lot. Furthermore, the manufacturer is in a position to know *ahead of time* if the shade of his yarn or fabric will meet specifications. If it does not, the necessary changes can be made on the minimum part of the stock shown to require such change.

2) Heathers and novelty mixed-color yarns can be produced only by stock- or top-dyeing separate dye loads to such different shades as will produce the novelty effect when properly blended.

3) Less fiber damage in shade correction can be expected in stock dyeing because of the principle of shade adjustment by throwing the shade of subsequent dyeings. The stock dyer almost never has to resort to prolonged boils, stripping and redyeing techniques, or the use of large quantities of expensive leveling agents, except in the case of small lots, where there is no opportunity for shade adjustment on later dyeings. This is particularly true in the case of wool, where chemical damage is a matter of prime importance to the quality of the fabric produced. For example, fabrics dyed in connection with the Wool Research Project of the Textile Research Institute *(2)* showed an increase in alkali solubility due to dyeing of the order of 15 to 27%. Similar wools dyed with similar classes of dyes in stock form

* Presented before the Symposium on Dyeing and Finishing, Group III, Yarns, held at the Philadelphia Textile Institute in Philadelphia, Pa, on Saturday morning, Oct 30, 1954, with Frederick V Traut presiding.

do not show an increase in alkali solubility of more than 4 to 10%, largely because of shorter dyeing cycles.

4) The cost of stock dyeing generally is much less. For example, the cost of dyeing Orlon 42 acrylic fiber black may be about 95¢ per lb of yarn, whereas Orlon staple can be stock-dyed for about 45¢ per lb. Pastel shades on this fiber may be stock-dyed for as little as 15¢ per lb. Of course, the spinner has to contend with colored stock in his plant as well as the accumulation of colored waste, but he can often afford this in view of the difference in dyeing cost.

5) It is sometimes possible to use unlevel dyeing colors of superior fastness because of the subsequent blending operations.

6) The stock form is the best form in which to effect fiber shrinkage. Certain synthetic fibers, such as Orlon 42 and Saran, can be expected to show shrinkage, sometimes unevenly, when the yarn or piece are dyed and dried. This can be avoided by "mock dyeing" the fiber in stock form. No dyestuffs are used but other chemicals may be employed along with the heat and moisture features. Also, antistatic or other finishes may be applied to the fiber in this way. Undyed fibers thus treated in stock form do not exhibit significant residual shrinkage when dyed later. Also spun-dyed fibers may require such treatment to effect fiber shrinkage. Such treatment often favorably improves the hand and promotes subsequent spinning efficiency.

7) When a fiber-blended yarn is required, the greatest uniformity of shade and optimum fastness with minimum damage can be obtained when the fibers are separately stock-dyed and blended in carding. This method also results in the only really good method of intimate fiber blending.

What fibers lend themselves to stock dyeing?

Apparently all fibers may be satisfactorily stock-dyed with the possible exception of fine wools intended for use on the worsted system. Because of the tendency of these wools to felt readily under conditions of dynamic pH, heat, moisture, pressure and agitation, it is difficult to avoid an increase in noilage in combing when the fiber has been stock-dyed. Top dyeing, which may be considered as a form of stock dyeing because the fibers are not yet in their final form of orientation with respect to each other, is often resorted to where it is desired to obtain some of the advantages associated with stock dyeing. However, stock dyeing is widely used in the woolen system on fine wools. Large weights of carpet wools are dyed in stock form, and, because dye lots are generally large, stock dyeing lends itself admirably to this industry. The new man-made fibers also lend themselves to stock dyeing, and certain fiber characteristics are obtained in this way that are not otherwise possible. Since most of the newer man-made fibers are hydrophobic, it is possible in many instances to hydroextract the dyed staple without resorting to drying. Good centrifugal extraction may reduce the moisture content of the stock to about 10%, a condition suitable for picking and carding, and one in which the static problem is minimized. By avoiding the dryer, yellowing and sticking effects are avoided. A notable exception to this is Dynel, which often must be relustered by drying at elevated temperatures.

What other processes are adaptable to stock-dyeing equipment?

Actually, a large variety of machine types are available for stock dyeing, equipment varying from the open tub with a low stock-to-liquor ratio to the pressure machine with high stock-to-liquor ratio. Besides dyeing, the stock machines are often used for bleaching with hydrogen peroxide, chlorine or sodium chlorite, depending on the fiber, stripping, application of finishes, such as softeners, antistatic agents, moth-resistant chemicals, shrink resistance, and scouring, where the matter to be scoured out is other than heavy dirt. For most of these operations the machines must be constructed of stainless steel for best results, although iron and wood are still used in many mills.

Can stock dyeing be made continuous?

Recent experiments have shown promise in the field of continuous stock dyeing. Among these have been suggested the Williams Unit and the Bond machine. Both of these machines require a large capital investment and therefore would not be expected to come into widespread use in the near future. However, the utilization of modified wool-scouring equipment has been successfully used for this purpose. Clapham has reported on this process for carpet wools *(3)*. Light to medium shades may be dyed by this process using neutral dyeing metalized colors or other fast-to-light dyes such as the neutral dyeing acid colors. This method has the great advantage of very short dyeing time and as a result chemical damage is held to a minimum. We have conducted plant runs on such continuous dyeing where the process was integrated with the scouring and even the carbonizing operations. Experiments have shown that this method results in less felting, matting and contraction of the fibers and as a result may show promise for use on fine wools. However, the method appears to be limited to relatively light shades and to large quantities, since equipment must be available for maintaining uniform solutions of the dyes being used and the clean-up problem does not allow for fast change of shade. In addition the color value obtained is somewhat less than that obtained from most dyestuffs in conventional dyeing, but this expense is offset by the elimination of separate handling of the wool after scouring or processing, by no resultant fiber loss, redrying or rebaling, and the labor and steam requirements are low where sizeable production is involved.

STOCK DYEING AT TEMPERATURES ABOVE THE BOIL

The subject of high-temperature dyeing has been the center of much interest in the textile industry, largely since the Philadelphia Section of the AATCC studied this *(4)*.

Research work on the practical aspects of high-temperature stock dyeing were begun at the Fred Whitaker Company in 1950, and in 1952 the first 1,000-lb stock dyeing machine was put into operation. The high temperatures in the dye machines were exceeded only by the temperatures of the personnel wrestling with the operations. Today, high-temperature dyeing has become a routine matter, although this is not to say that there are no more unsolved problems.

Why dye at temperatures above the boil?

Perhaps the greatest reason for high-temperature dyeing may be summed up in the words: "the newer man-made fibers." The acrylic and polyester fibers have been particularly hard to dye from the standpoint of dye penetration, depth of shade, reasonable cycle of dyeing time and optimum fastness. In addition, the cost of dyeing these fibers is very high compared with the older synthetics and the natural fibers. Then there is always the incentive to do the job in a shorter time in order to increase productive capacity. It should be realized that conventional pressure machines seldom are capable of operating over 205°F, although this dyeing temperature is sometimes referred to as the "boil" because of boiling-over tendencies in the expansion tank when this temperature is exceeded. Often the difference in the dye exhaustion rate and the shift in equilibrium from the solution to the fiber are compelling factors in favor of high-temperature dyeing.

What machine changes are necessary for high-temperature dyeing?

Not all so-called "pressure machines" are suitable for high-temperature stock dyeing. Most states have requirements for

coded vessels and the insurance companies have rigid specifications on machine construction. Stainless-steel analysis, certified welding, and plate thickness are important considerations. Flat covers or bottoms are not acceptable. Gaskets and packing must be special. Closed heating coils or other types of heat exchangers must provide for a rapid heat-transfer rate. Steam traps must be balanced against the amount of steam condensate produced. Proper instrumentation in the form of pressure gauges, recording temperature controls, time-cycle controls and alarms are very important. Pressure relief valves must be provided, preset in accordance with the allowable working pressure in the machine. The recirculating piping must be changed so that the expansion tank can be cut off from the dye system when the temperature approaches the boil. Special provision must be made for sampling or observing the dyebath to check dye exhaustion, and generally a method is provided for sampling the dyed stock without removing the load from the machine. In short, the machine must be designed for the purpose. Very few machines built before 1950 are suitable for conversion to high-temperature units.

What are the advantages of high-temperature dyeing from the standpoint of the dyer?

Just as most chemical reactions have their rates increased by increases in temperature, so dyeing rates increase with higher temperatures. This means lower costs because of higher production. Cross sections of most fibers show superior penetration, and ring dyeing is almost eliminated. The rate of leveling is increased at high temperatures, and the fibers have a more uniform appearance. Dyestuff dispersion is better at higher temperatures, and the tendency for dye aggregation is reduced. The fibers exhibit greater swelling at higher temperatures and thus allow better access to the dye molecule. This generally eliminates the need for special carriers, thus further reducing the cost. Since the usual dye carriers, or swelling agents often adversely affect light fastness, they must be scoured out after they have accomplished their purpose. Obviously, there is no need for such removal where no carrier is used. Lastly, the dyer is often pleased to find that he gets greater value from his dyestuff at high temperatures than he can obtain in the conventional way.

What are the advantages of high-temperature stock dyeing from the standpoint of the yarn and fabric manufacturer?

Again, lower cost must stand at the head of the list. But there are a number of other advantages. Light fastness is improved in many cases, wet and dry crocking are better, and washfastness is superior. Fiber shrinkage is accomplished so that this fiber characteristic does not interfere in later operations. A most important feature, often overlooked, is that, with many fibers, enhanced crimp is obtained. The fibers are "crimp-set" in the random way they are oriented in the dyebath. Angular crimps in addition to the regularly supplied crimp are imparted and make for better loftiness in the yarns. Since there is little effect on the physical properties of the fiber, it is feasible to stock-dye fibers like Orlon and Dacron at a high temperature and then to produce top from the dyed staple for use on the worsted system. Blends of more than one fiber can be carded together in this way. In case the crock or wash fastness is not as good as is wanted, subsequent piece scouring, fulling or other operations serve to improve these characteristics.

What are the problems of high-temperature stock dyeing?

Levelness is the great problem here because of the tendency of many of the fibers to pack into a solid mass under wet pressure. This problem is especially true of the acrylic fibers. And where packing is present, there is also often channeling. A number of techniques including wet loading, reduced dye-liquor flow rate, and reduced pressure have been employed to overcome this problem. Disperse dyes in very light shades and basic dyes in darker shades do not present too great a problem in this respect. However, for men's wear fastness on Orlon acrylic fiber it is necessary to use the cuprous-ion method of dyeing, and here the problem of levelness can be really acute. Navy, brown and black are shades most often requiring the cuprous-ion method. Once the fiber is unlevely dyed at high temperatures, no leveling of any account is possible. The unlevelness is generally in the form of undyed or lightly dyed portions where packing was so great as to prevent the flow of the liquor through the stock. Once the dye is fixed, no further migration occurs.

A second problem encountered is the difficulty of sampling the dye lot accurately as dyeing proceeds. Sample kiers externally mounted seldom give a shade that can be depended upon to represent the entire load. This is so because slight differences in loading the stock upset the flow-balance ratio between the sample and the main part of the lot. Thus, it is impossible to know how the dyeing is turning out until the whole load can be examined. To attempt to examine the load before the end of operations would mean that the pressure and temperature must be dropped below 212°F, so that the cover can be removed and the carrier raised for inspection. It thus behooves the dyer to attain success on his first trial.

A third problem is that dye-machine operators of somewhat higher caliber are needed than for usual machine operation. This generally means higher pay rates.

A fourth problem is that formulas must be developed under high-temperature conditions in the laboratory. This means that laboratory-scale high-temperature equipment must be available and that dyeings made in it must be reasonably well reproduced in the mill. For this purpose we have designed and built several units of such size as to handle about ¼ pound of stock.

What are other advantages of a closed system?

While the machines have been built primarily for high-temperature dyeing, it should be recognized that, when the recirculating system is closed off from the expansion tank, the machines may be operated at any temperature, including those below the boil. Use of the closed system allows such advantages as the following:

a) Volatile and toxic materials, such as monochlorobenzene, sodium chlorite, etc, may be used without loss and without danger to personnel.

b) A closed system allows the attainment of a true boiling temperature or slightly above, such as 215° F, for Dynel or Saran.

c) The closed system eliminates the side expansion tank for dissolving dyes and chemicals and introducing them to the system. The resultant low liquor ratio gives better value from the dyes.

d) Steam consumption is reduced because of the elimination of liquor distilled as uncondensed steam, which is lost when attempts are made to maintain a true boil in the open system.

Do carriers have a place in high-temperature dyeing?

In general, exhaustion is satisfactory without carriers at the best dyeing temperatures of about 225°F for Orlon 42 and 250°F for Dacron. However, dark shades on Dacron are so expensive with disperse dyes that ways are being investigated to increase dye substantivity. There can be little doubt that high temperature without carriers is much better in this respect than conventional temperatures with carriers. This may be seen from an examination of the exhibit card. Recent studies *(5)* have indicated that methyl salicylate is superior as a carrier for disperse dyes on Dacron than other carriers commonly used, and particularly than monochlorobenzene, the most efficient material previously reported. However, our experiments, shown by the brown samples, indicate that high-temperature dyeing

without a carrier is far superior to open-system dyeing with methyl salicylate. While some carriers tend to impede dyeing at 250°F, a few sometimes show a slight improvement on dark shades. Where brightness is not required, the use of developed colors on Dacron gives excellent results at relatively low cost at high temperatures without carriers. However, our experiments indicate that, under the one set of dyeing conditions tested, high-temperature dyeing without a carrier gives a much deeper dyeing on the Dacron than the open system with 6 g per liter of methyl salicylate in a 1-to-10 stock-to-liquor ratio. In this particular case a nonionic emulsifier was used to the extent of 20% on the weight of the methyl salicylate. The use of less emulsifier may improve the depth of shade of a methyl salicylate dyeing, but, with too little emulsifier, there is some danger of blotchiness due to poorly emulsified carrier.

What fibers are suitable for dyeing at high temperatures?

It should be realized that all fibers are not equally damaged under the same conditions of high temperatures. Fortunately, the fibers most in need of high-temperature dyeing are best able to withstand these more rigorous conditions. In this discussion the term *high temperature* is taken to mean any temperature higher than that possible to attain in an open system. Thus, 212°F would be considered *high-temperature* by this standard, since 205-210°F would represent the highest temperature attainable without resorting to a closed system. The following observations on the high-temperature stock dyeing of a few of the various fibers have been made:

1) While most recommendations for dyeing Acrilan have suggested the use of conventional dyeing temperatures, indications are that there are some advantages to dyeing at high temperatures.

2) Acetate loses strength rapidly at temperatures above the boil and for this reason alone is not suitable for high-temperature dyeing.

3) Nylon can be dyed to advantage under pressure, particularly in dark shades with chrome colors. A temperature of 250°F seems to be satisfactory for nylon, but any temperature between 212 and 250°F may be used.

4) Dacron, one of the main reasons for high-temperature dyeing, can be dyed satisfactorily at 250-260°F. Since Dacron does not pack excessively under pressure, good leveling is possible with disperse dyes. Perhaps one of the greatest needs in Dacron dyeing is a formula for a full, bright navy shade with good crocking and wet fastness at a reasonable price, say, less than 35¢ per pound.

5) Orlon 42 shows sticking and fusing properties at 250°F, but temperatures up to 230°F are used satisfactorily on this fiber. Orlon 41 or 81 waste still are best dyed at 250°F.

6) Wool can often be dyed to advantage at elevated temperatures. Zimmerman *(6)* has reported that no loss in tensile strength occurs at 270°F in a 50-second dyeing time, which gave the same shade as 1-1/3 hours at 210°F. Unfortunately, it is not possible to stock-dye in a batch high-temperature machine in 50 seconds. Iannarone, Clapham, and Thomas *(7)* have reported on wool dyeings made at 225°F claiming less impairment of physical properties than with conventional dyeings. Our own studies have been substantially in agreement with this. In one example, wool was dyed and chromed at 212°F to a navy shade. About one-half of the over-all dyeing time was required to obtain the same shade at 225°F. The wool was tested by fiber-bundle tests with the following results:

	212° F	*225° F*
% Elongation	35%	45%
Breaking strength	151 lb/g	180 lb/g
Strength related to undyed wool	67%	79%

6) Criticism of high-temperature dyeing at 250°F of blends of wool with Orlon or Dacron has been made by Luttringhaus *(8)*, stating that, with fine wools, the damage was so excessive that a tensile-strength test could no longer be taken. Tests made in our laboratory showed the following results on a chrome-dyed navy-blue shade, dyed in conjunction with Dacron in a blend:

	250° F 1½ hr	*225° F 2½ hr*
% Elongation	28%	37%
Strength, lb/g	90	175
Strength, related to undyed wool	40%	78%

The 225°F conditions produced a satisfactory navy on a Dacron-wool blend of worsted laps. The strength and elongations were not substantially different from that obtained from conventionally dyed wool. Of course, it should be realized that the dyeing of blends in stock form is not the usual thing. One would not deliberately blend two such fibers when each could be separately dyed to advantage and with less damage and better color fastness on each.

7) Dynel staple can be dyed to advantage and without fiber damage at about 215-220°F. Considerable improvement in color value is obtained by this 10° increase in temperature. A temperature of 250°F is apt to produce a fused plastic mass of Dynel.

8) Saran may be dyed to advantage at 212-215°F with selected disperse dyes. The closed system has the advantage of reducing the loss of volatile, light stabilizer, which is so important to the light fastness of this fiber.

What about the future of stock dyeing?

The present pattern should continue along the lines developed in the past. Wherever possible, the material is dyed in piece form, while, if yarns of more than one color are to be used, yarn dyeing is advantageously employed. If the yarns themselves are to contain fibers of more than one color, dyeing must be carried out in stock form. Large lots of single colors for carpet wools will probably always be an important production item. The apparel woolen trade will also continue to use stock dyeing, and, wherever blends are found, there will be good reason to consider stock dyeing. Finally, as still more man-made fibers reach the market, there will be a great incentive to continue dyeing these "wonder fibers" one at a time.

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(6) Zimmerman, C L, *ibid* 42, P19 (1953).
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(8) Luttringhaus, H, *ibid* 44, P194 (1955).

NOTICE

To Authors and Section Officials

Under a new ruling of the Publications Committee, all papers presented before local sections of AATCC must be submitted direct to the managing editor of the AMERICAN DYESTUFF REPORTER, 44 East 23rd St, New York 10, N Y. Two copies of each manuscript should be submitted in accordance with the "Notice to Authors", which appears periodically in the *Proceedings*.

ANNUAL OUTING • NEW YORK SECTION • JUNE 17, 1955

(See report on Page P451 of previous issue)

Photos by Louis J Dogin, American Aniline Products, Inc

Special Awards to Officers and Councilors

Photos by Louis J Dogin, American Aniline Products, Inc

CONVENTION TOPICS

EXECUTIVE COMMITTEE FOR ATLANTIC CITY CONVENTION——The above photo was taken during the June 6th meeting of the Committee at Beck's Restaurant, Philadelphia.

Seated (l to r): Thomas H Hart, The Hart Products Corp, *reception;* Ange E Raimo, John Campbell Co, *registration;* Edward C Diehl, Ankokas Dyeing & Processing Co, *reservations;* Herman L Steen, Geigy Dyestuffs Div, co-*chairman;* Frederick V Traut, Globe Dye Works, *chairman;* Harry L Morgan, James Lees & Sons Co, *finance;* Carleton T Anderson, Ciba Co, Inc, *exhibits;* Ernst W Empting, General Dyestuff Co, *registration;* Robert K Johnston, Daily News Record, *publicity.*

Standing (l to r): Graham J Littlewood, III, G J Littlewood & Son, Inc, *alumni luncheon;* Thomas R Scanlan, Jr, The Hart Products Corp, *publicity;* Richard A Shimp, E I du Pont de Nemours & Co, Inc, *transportation;* Arthur W Etchells, Hellwig Dyeing Corp, *technical program;* Thomas J Scanlon, T J Scanlon Co, *printing and personnel;* Donald W Robinson, Para-Chem Inc, *secretary;* Richard R Frey, assistant secretary, AATCC, *exhibits;* Francis E Nevins, Ciba Co, Inc, *dining.*

Not present when photo was taken were John L Fancourt, W F Fancourt & Co, *entertainment;* and Matthew A Noonan, Becco Sales Corp, *ladies.*

Elliot Broadbent will be the main speaker at the Olney Award Luncheon Thursday, Sept 22. He will outline the accomplishments of Miles A Dahlen, 1955 winner of the honor, and will give some details of the private background of the Olney Medalist.

* * *

Raymond Jacoby, AATCC president, is an honorary member of the Convention Reception Committee, as are vice-presidents George Baxter, George Linberg, Joseph Jones and Walter Scott.

Chairman is Thomas Hart, and other members are Jack Adams, vice-chairman; John Huber, J William Kirk, A M Gordon, James Lord, Mervyn Bartholomew, Walter W Gleadall, Frank Vellner, Alfred Koch, William Humphreys, Edward S Atkinson and W Russell Harris, Jr.

A fully functioning press room will be operating at the Convention to insure best press coverage of all the Convention and Exhibition features. T R Scanlan, Jr, is Convention publicity chairman, and is assisted on this committee by Allen Sommers, Robert Johnston, John Birch, Murray Spring, John Berg and Alfred Cowan. National Publicity Committee—J A Doyle, chairman—will also cooperate in setting up and managing the Convention press and publicity operation.

* * *

A total of seven of the leading hotels in Atlantic City will be co-operating to house those attending the Convention. The Haddon Hall and the Chalfonte, connected, are the headquarters hotels. And rooms are also available in the Lafayette, Colton Manor, Seaside, Abbey and Senator hotels.

All reservations must be made through Edward Diehl, reservations chairman, Ankokas Dyeing and Processing Co, Mount Holly, N J, on forms provided for this purpose.

* * *

Exhibits in the annual Dyeing and Finishing Exhibit will be set up Tuesday, Sept 20, the day before initial registration for the Convention. Official exhibition hours will begin Wednesday, Sept 21 and continue through Saturday, Sept 24, until 4 pm, at which exhibits will be dismantled.

* * *

Council, at a recent meeting in New York, confirmed Frederick V Traut, chairman of the 1955 Convention Committee, as a member of the National Convention Committee, replacing the late Walter Fancourt. Mr Traut has been serving in Mr Fancourt's stead for the last several months on this Council committee.

• PATENT DIGEST •

PAUL WENGRAF

PRINTING ASSISTANT FOR VARIOUS FIBERS——— Sulfolanes and Alkylsubstitutes Thereof D,1

Brit Pat 708,248 (Imperial Chemical Industries ——Clark——May 5, 1954)

The sulfolanes or cyclic tetramethyl sulfones, ie, CH_2 ——— CH_2 | $CH_2—SO_2—CH_2$, have been advocated especially in ICI's British Patents 609,944 and 609,947 as efficient assistants for printing when disperse (acetate) dyes and leucosulfuric acid esters of vat dyes (Indigosols) are applied to cellulose, cellulose acetate, nylon, wool or silk. Sulfolanes or alkyl substitutes thereof, eg, dimethyl tetrahydro thiophene dioxide, are incorporated in the standard printing pastes.

Most of the examples in this patent specification refer to the use of the dimethylated product. Otherwise the printing formulas and development of the prints are the same as those in conventional processes. Dyestuffs cited in the examples are, among others, vat dyes (Caledon Blue RCS, *C I* 1114), copper phthalocyanine, disperse dyes, stabilized diazonium dyes and acid dyes (Coomassie Red PGP, Schultz Tab #379).

Disperse dyes are said to give more level, speck-free prints; they are fixed in a shorter steaming period, sometimes without any steaming. Acid dyes are best dissolved in the paste by adding sulfolanes. The same is true for diazonium dyes.

The specification refers to Brit Pat 207,499 (Naugatuck Co), which is apparently parallel to USPat 1,471,213 (1923). BP 207,449 refers to the preparation of triethyl trimethylene triamine, which also proved to be an effective printing assistant. Combinations of this compound with sulfolanes are said to give still brighter and stronger prints; on the other hand, the effect of sulfolanes is said to be superior in itself to that obtained with the above-mentioned triamines.

PARCHMENTIZED PRINTS ———Resists Containing Pigmented Emulsions D,1

Brit Pat 709,735 (Bleacher's Assoc Ltd——Davis ——June 2, 1954)

Brit Pat 630,172, which is assigned to the same Company {cf *Am Dyestuff Reptr 39*, 335 (1950)} describes a method for producing print resists that are unaffected by parchmentizing on the basis of thickened water-repellent agents of the "Velan PF" type.

Further progress in the manufacture of preprinting pastes containing emulsions of pigments and organic solvent solutions of thermohardening resins is reported in the current patent. These compositions are best exemplified by the "Aridye" (or "Helizarine") printing emulsions. Not only do the preprinted pastes stand the parchmentizing treatment with cold concentrated sulfuric acid (including subsequent mercerizing and neutralizing passages) well, but the prints remain soft and supple in contrast to the nonprinted, stiffened and translucent areas. Moreover, it has been observed that the pigment content in itself is not essential for this effect; ***nonpigmented resin emulsions*** are said to behave in an analogous way. The prints must be cured at temperatures between 105-150° C before they are entered into the parchmentizing acid.

Example: "Aridye White" is mixed with "Aridye Cut Clear" at a ratio 1:2, and some titanium dioxide is milled into this blend. Cotton fabrics printed with this paste, cured for 2 minutes at 140° C and then parchmentized yield opaque white soft prints on a translucent, crisp and stiff ground.

Another example refers to a printing paste of Aridye Red FG combined with a Velan PF paste, prepared according to a method covered by Brit Pat 630,172.

Reference is made to Ginzel's USPat 2,611,678 of Sept 23, 1952 {cf *Am Dyestuff Reptr 42*, 266 (1953)}, which quite generally protects the use of pigmented "oleaginous" emulsions as resists in parchmentizing processes. The application for which British Patent 709,735 was granted was filed on June 1, 1951, before USPat 2,611,678 had been granted.

CELLULOSE ACETATE——— Differential Delustering and Coloring Effects F,3,02

Brit Pat 709,832 (Courtaulds Ltd—— June 2, 1954)

In the production of cellulose-acetate filaments cellulose is treated with acetic anhydride in a solvent which may be either glacial acetic acid or (according to Atlas Powder's USPat 2,126,190/1938) a chlorinated hydrocarbon, preferably methylene chloride.

The current patent is based on the discovery that cellulose acetate yarns produced according to the respective acetic acid and methylene chloride methods show different effects when they are subsequently delustered according to standard methods, eg, boiling with water or dilute phenol solutions. Furthermore, the delustered filaments have different dye affinities when treated in the same dyebath. Stripes of different depth of shade may be obtained on a fabric by weaving or knitting with both types of (delustered) cellulose acetate yarns, by using twisted threads of these yarns, etc.

Example: A fabric consisting of viscose rayon crepe filling and a warp made up of alternate bands of acetate yarns prepared by the acid process and by the methylene-chloride process respectively is delustered with a 30-minute boil in 0.25% solution of phenol in water. A subsequent dyeing with Solacet Brill Blue BS results in striped effects, the methylene-chloride-type fibers appearing as a lighter shade.

The treatment of pigmented yarns of cellulose acetate in an analogous way is within the scope of this patent.

CELLULOSE ACETATE WITH WOOL DYEING PROPERTIES ———Linear Polyurethanes Incorporated C,4,07

USPat 2,675,360 (Eastman Kodak——Caldwell ——April 13, 1954)

This invention aims at producing cellulose-acetate fibers that have affinity for wool dyestuffs, thus giving uniform acid-dyeing results when they are combined with wool or other animal fibers. This is said to be accomplished by incorporating linear polyurethanes in the solvent (for the most part acetone) of the spinning dope.

The polyurethanes employed in this process are prepared by reacting amines containing one tertiary amino group, eg, methyl bisamino propylamine . . . $CH_3N:(CH_2\text{-}CH_2\text{-}CH_2\text{-}NH_2)_2$ or the like, with dichlorocarbonates of glycol. The specifications describe the manufacture of a polyurethane from dichlorocarbonate of hexane diol and ethyl bisaminoethyl ethyl amine. The linear polymer may contain up to 100 urethane units.

References cited by the Patent Office:

USPat 2,356,079 (General Aniline & Film Corp/1944): increasing the affinity of *cellulosic fibers* for acid dyes (animaliz-

ing) by reacting them with polyureas or polyurethanes obtained by condensing (aromatic) diisocyanates with polyalkylene polyamines.

Brit Pat 615,884 (Dreyfus/1949) refers to the manufacture of filament-forming high molecular N-containing polymers, which are obtained by condensing diamines, eg, hexamethylene diamine, with dischloroformic esters, such as ethylene bischloroformate.

BLEACHING WOOL WITH ALKALINE PEROXIDE——— Formaldehyde Pretreatment B,2

USPat 2,676,871 (Du Pont——McGovern——April 27, 1954)

Formaldehyde is known to react readily with hydrogen peroxide under alkaline conditions, quantitatively forming sodium formate. An analytical method for determining formaldehyde based on this reaction is reported in *Textilber 31*, 2979 (1898). On the other hand, formaldehyde combines only loosely with wool. Thus it could be expected that an alkaline peroxide solution would quickly remove formaldehyde from its combination with wool.

Surprisingly, it has been found that wool-bleaching processes using alkaline peroxide can be promoted considerably by a formaldehyde pretreatment. The use of alkaline peroxide solutions in the bleaching of wool generally takes from 6 to 16 hours, while causing some damage to the fibers, and temperatures of 120° F are best avoided. In contrast, a pretreatment with formaldehyde, under conditions such that at least 0.3% and preferably 0.5-1.0% combines with the wool substance, makes it possible to bleach the material rapidly at elevated temperatures (120-180° F) with minimum damage to the fiber.

A table compares alkali solubility and whiteness on pretreated and nontreated specimens. The pretreatment calls for the soaking of wool skeins for 30 minutes at 120° F in a solution of 4.5 grams formaldehyde per liter, the pH being adjusted to 6.5. After a rinse, the content on combined formaldehyde is about 0.8%. The alkali solubility (correlated to fiber degradation) of the formaldehyde-treated fibers is lower by far than that of the nontreated material.

Among the references cited by the Patent Office:

USPat 2,427,097 (Kamlet et al/1947): chlorinating wool (especially in shrinkproofing treatments) by a formaldehyde pretreatment plus a wetting agent, then by immersion in a chlorosulfamic salt, eg, sodium chlorosulfamate or sodium dichlorosulfamate [cf *Am Dyestuff Reptr 36*, 788 (1947)].

USPat 2,422,856 (Am Cyanamid/1947): adding an aldehyde (formaldehyde) to acid dyebaths which contain certain chrome-complex azo dyes in order to prevent demetalization of the dye and tendering of the wool substance, and to prevent the latter from becoming harsh [cf *Am Dyestuff Reptr 36*, 665 (1947)].

USPat 2,220,805 (Aldox Corp/1940): treating animal fibers with a detergent plus aldehyde (thereby lowering the melting points of adherent contaminating greasy substances), rinsing, oxidizing, and removing the remaining combined aldehyde.

USPat 2,220,426 (Aldox Corp/1940): impregnating cellulosic fibers with formaldehyde and subsequently treating with an oxidizing bleaching solution.

USPat 1,713,641 (Boehm/1924): treating (wool) hats first with an acid-formaldehyde solution, and then preferably with peroxide.

Textile Colorist, 1944, p201 (Technicus) contains an article on a method for avoiding damage to wool by alkalis or acids by pretreating the material in a bath of 1% solution of formaldehyde for one hour at 70° F.

SHRINKPROOFING WOOL ———Combination of High-molecular Hydrocarbons and Fixatives A,2,04

USPat 2,678,286 (Du Pont——Bruner, Lehr——May 11, 1954)

The tendency for wool or other keratinous fibers to shrink can be reduced by treating them with high-molecular-weight substituted-hydrocarbon polymers ("addition agents") combined with certain fixing agents. The action of both components is reported to be confined to the surface of the fibers.

The "addition agents" used in the current process consist chiefly of chlorosulfonated ethylene or chlorosulfonated isobutylene polymers of a molecular weight of 10.000-19.000. The fixing agents may be polyamino-, polyhydroxy-, or polymercapto compounds. The examples refer specifically to hexamethylene diamine or 3-methoxy-hexamethylene diamine, applied in relatively small percentages in relation to the addition agents, eg, for 1-20% of the polymer, 0.005-0.5% fixing agent. The latter appears to serve primarily as a cross-linking agent between the molecules of the addition agent or between the addition agent and the wool molecules.

The mixture of these agents is applied generally from solvent solutions, eg, toluene, or from dispersions prepared with Tween 20. The examples imply that a curing temperature of 150° C should be attained within 5 min, but higher or lower temperatures may be applied as well with shorter or longer curing periods respectively.

It is claimed that satisfactory shrinkproofing results may be observed while tensile strength, softness, color and durability of the material are unaltered.

Among the references cited by the Patent Office:

USPat 2,471,456 (Montclair Research/1949): shrinkproofing wool using synthetic chloroprene polymers combined with a *noncationic* emulsifying agent and a water-soluble neutral salt [cf *Am Dyestuff Reptr 38*, 738 (1949)].

USPat 2,413,163 (Du Pont/1946) covers a flameproofing composition consisting of inorganic oxides and sulfides, organic substances containing 20% or more chlorine, and a formaldehyde-amine-protein condensate [cf *Am Dyestuff Reptr 36*, 338, 1947)].

USPat 2,507,699 (Du Pont/1950) covers a coating composition made up with a chlorosulfonated ethylene polymer and polyoxyethylene glycol.

Brit Pat 611,828 (Wolsey Ltd——Alexander/1948): shrinkproofing wool by impregnating first with a cationic emulsifier (Fixanol C, Lissolamine), then with a resinous vinyl-polymer emulsion containing an anion-active agent, and subsequently curing.

THE ANNUAL INDEX TO THE PATENT DIGEST WILL APPEAR IN THE AUGUST 1st ISSUE

ABSTRACTS

Here's the Dope on Dope-Dyed

Anon, *Textile Inds* 118, 126-33, March, 1954.

"Dope-dyed" describes synthetic fibers colored before extrusion by incorporating pigments or dyes into the spinning solution. Other terms for these fibers are "solution-dyed" and "spun-dyed".

Synthetic fiber producers have experimented with dope-dyed yarns and staple for years, but except for black there has been little demand for them, principally because of the inventory problem. Since World War II, however, and particularly within the past year, a widening interest in dope-dyed synthetics has caused them to be offered by most of the major synthetic fiber producers. To date, acetate filament and staple have made up the bulk of the production of these fibers in the U S, but recently commercial manufacture of dope-dyed viscose and Dynel has begun, in filament and staple form, and dope-dyed tow in acetate and viscose will soon be available.

Interest in dope-dyed fibers is centered mainly on their excellent fastness to washing, light, drycleaning, perspiration, crocking, and in the case of acetate, excellent fastness to atmospheric fumes. On the other hand, dope-dyed fibers, according to the authors, are more difficult to process than uncolored, costs are usually higher, and contamination of white stock by colored fibers is an ever-present danger.

Following are the trade names and manufacturers of the various types:

Jet-Spun (American Enka Corp)
Colorspun (American Viscose Corp)
Color-Spun (Carbide & Carbon Chemicals Co)
Celaperm (Celanese Corp)
Chromspun (Tennessee Eastman)
Coloray (Courtaulds)

The author gives much information on the handling of dope-dyed fibers in the mill.—WHC.

High-Temperature Sulfur Dyeing of Cotton

J L Taylor and W A Murauskas, *Textile Inds* 118, 122-4, September, 1954.

The fund of empirical knowledge in the case of high temperatures has grown to such size in recent years as to become an important supplement to the science of dyeing. The benefits to be realized from the use of high temperatures already have been recognized to be of sufficient value to warrant the design and construction of special equipment for this purpose.

The work undertaken by the authors at Georgia Tech was intended to determine whether the high-temperature technique could be profitably applied to the dyeing of sulfur colors on cotton yarn.

A Morton 1-lb package machine of special design was employed for the dyeings, and a comparison was made of dyeings made at 190°F and 250°F. Five different sulfur dyes were used.

The authors found that at the higher temperature the dyes yielded an increased exhaustion of from 5% to 34% over the dyeings made at normal temperature, and there was a considerable reduction in dyeing time. No significant loss of strength was noted in the yarn at either temperature, and no appreciable difference in light and wash fastness was found. However, two of the dyes produced a somewhat different shade at the high temperature.

The authors believe that this investigation gives some indication of the potential benefits that are available to any cotton yarn dyeing plant equipped with pressure apparatus.—WHC.

A Microscopical Study of the Effects of Some Typical Chemical Environments on the Primary Wall of the Cotton Fiber

V W Tripp, A T Moore, and M I. Rollins, *Textile Research J* 24, 956-70, November, 1954.

The topography and structure of the primary wall of the cotton lint fiber are described and illustrated by electron micrographs. The changes in this thin membrane brought about by alkali boil (kiering), hypochlorite and peroxide bleaching, mercerization, acid hydrolysis, and dry heat are shown by means of microscopical examination of isolated pieces of the primary wall after exposure to these environments. The noncellulosic constituents of the wall, which account for a large part of its chemical composition, are progressively removed during alkaline kiering. Excessive conditions of kiering appear to damage the cellulose framework of the wall. Peroxide bleaching is apparently effective in removing the encrusting noncellulosic material, but hypochlorite alone does not have this effect.

Mercerization of the isolated wall induces shrinkage in both longitudinal and transverse directions; the shrinkage increases when the noncellulosic materials are removed from the membrane prior to mercerization. The morphology and structure of the wall account for the observed behavior on mercerization, and electron micrographs of the mercerized wall show a shrunken network of cellulose fibrils. The primary wall shows resistance to disintegration by acid hydrolysis, and its fibrillar pattern is preserved intact, after long periods of contact with hot mineral acid. Long periods of heating in air "set" the primary wall in a configuration similar to that which it had on the corrugated surface of the cotton fiber.

The contribution of the primary wall to certain gross properties of the fiber and its behavior during finishing treatments is discussed.

Twenty-four references to the literature are cited.—WHC.

Azoic Dyeing of Acetate Rayon

I M S Walls, *J Soc Dyers Colourists* 70, 429-35, October, 1954.

The application of azoic dyes to acetate rayon does not represent a new method of coloring this fiber. It is more than 25 years since the first attempt was made to dye acetate rayon in this way. Azoic dyes cannot be applied by the technique used for cotton or viscose rayon for two reasons:

a) The coupling components (Naphthols) cannot be applied from moderately strong alkaline solutions of their sodium salts, owing to saponification of the fiber by solutions of such alkalinity at the dyeing temperatures required.

b) The diazo components cannot be applied from cold solutions to the fiber impregnated with the coupling component. In such solutions the acetate rayon is only slightly swollen, and its small pore size prevents adequate diffusion of the diazotized base into the fiber. If the temperature is raised to swell the fiber, the diazotized bases decompose.

The author describes the so-called "modified azoic" technique, in which the base and the coupling component are applied to the fiber in one bath, and development is carried out *in situ* in a second bath. He states that a range of Brenthol (Naphthol) coupling components has been applied to acetate rayon from neutral and from weakly alkaline baths, the latter with and without common salt, and the uptakes have been measured. Similarly the exhaustion of diazo components has been determined. This information, which is tabulated by the author, is used as a guide to the most suitable azoic components for acetate rayon, and to the conditions under which they should be applied.

An investigation, which is described, has been carried out into the ratio in which the coupling and diazo components should be mixed when they are applied to the fiber together, and the best conditions for diazotizing and coupling have been determined.

The factors involved in the soaping aftertreatments are discussed, and recommendations are made for the best soaping conditions. The lightfastness properties of a wide range of azoic combinations on bright acetate rayon are also tabulated.

Twelve references to the literature are cited.—WHC.

News of the Trade

• Nopco Seeking New Markets for Water-Soluble Polymers and Resin Emulsions

The Nopco Chemical Company has expressed an interest in developing new markets for its line of water-soluble polymers and resin emulsions produced by polymerization and copolymerization reaction.

According to Edwin A Robinson, vice president in charge of Nopco's industrial product development program, a new polymerization unit has been installed at the company's Cedartown, Ga plant, to provide facilities for large-scale production of these products. The polymers and resin emulsions are currently used as textile warp sizes, adhesive components, and paper coating binders.

Dr Robinson mentioned the development of a group of ethylene oxide condensates for use as detergents, emulsifiers, and surface-active agents. These condensates, he said, showed extreme stability in the presence of acids, alkalis, and inorganic salts.

• New Sunlight-Fading Station Set Up in Florida

The Solar Light Fastness Testing Station, under the direction of Theodore E Nestler, has been established at Ft Myers, Florida.

The new station is equipped to handle dyed samples of textiles or leather. Samples are put in an exposure box at 9 am and taken out at 3 pm each day of exposure until total desired exposure time is attained. Total hours of exposure are measured by AATCC Blue Standards.

Prices which apply to dyed samples mounted on cards approximately 3 x 5 to be exposed under glass by AATCC tentative test method or according to the client's modification thereof may be obtained by writing to the Station at Box 648, Ft Myers.

• Cravenette Appoints New Sponger Agent

The Cravenette Company, U S A, Hoboken, N J, has announced the appointment of Eastern Textile Shrinkers, 880 Broadway, New York, as an authorized agent.

Eastern Textile Shrinkers will now be in position to apply "Cravenette' water-repelling preparations to a varied line of textile fabrics. Among the processes they will apply will be "Cravenette" Super Silicone water repellent for woolens and worsteds.

The 1955 calendar of American Cyanamid Company (as shown above) was recently awarded 3rd Prize in the Lithographers National Association Awards Competition in Chicago. The calendar's full-color illustration, depicting early methods of leather dyeing in America, was painted for Cyanamid by artist John Clymer. It was printed by Kindred, MacLean & Co, Inc.

Produced by the company's Organic Chemicals Division and Pigments Division, the Cyanamid calendar has been distributed annually for the past 18 years to approximately 18,000 companies and individuals all over the world.

• LTI Dean Urges Broader Scientific Background in Textile Curricula

Speaking at the 63rd annual meeting of the American Society of Engineering Education, held at Pennsylvania State University June 20-24, Dean Charles F Edlund of Lowell Technological Institute urged a more analytic treatment of the traditional textile courses in the textile college curriculum. His talk, entitled "When Should Specialization Start in the Undergraduate Program?", was part of a symposium on textile engineering attended by the country's most prominent textile educators.

"Too often," stated Dean Edlund, "we leave the basic sciences behind when we complete the specialization process. Our hope in the future requires that we take them with us into the more specialized courses.

Pointing out the new emphasis in the industry on management, finance and marketing, Dean Edlund proposed that the undergraduate be given a broad scientific background which, linked with a flexible attitude of mind, will fit him to be of maximum service to his employer in meeting the highly technical and rapidly-changing conditions in the industry. "All this means that it is no longer possible to train undergraduates in specific processes and equipment, or at least not profitable to do so . . . the proper preparation for the textile industry must now be broad because the industry has become broad. There must be greater emphasis on the 'why' rather than the 'how' and on 'science' rather than the 'art'. The development of the background for all this takes time and means the postponement of final specialization in textiles to the latter part of the four-year program."

"Because of the limits of time," he asserted "industry or the graduate school must be looked to to complete the final specialization. On the undergraduate level, 'the textile colleges' first concern must be "to furnish the student with the proper scientific and engineering base, instill the research attitude of mind, and introduce him to the analytical application of these to the problems of the textile industry. Thus equipped he can meet the challenge of today's most challenging industry."

• Chemical Engineers to Convene at Lake Placid

Picturesque Lake Placid, N Y will be the scene from September 26-28th of the fall national meeting for approximately 500 chemical engineers from throughout the United States.

Highlights of the technical program will be the presentation of the symposium on "Atoms for Profit," presided over by W Kenneth Davis, U S Atomic Energy Commission, and "Growth of the Oil and Chemical Industry by Integration," presided over by F W Simpson, Petroleum Chemicals, Inc.

The informal theme of the conference will be, "Chemical Engineer Meets Top Management".

• Women Sweep NETF Scholarship Contests

For the first time since New England Textile Foundation instituted its annual scholarship award competition in 1946, women this year swept the field. $7800 in four-year scholarships will go to the five winning contestants.

Winners include Joan R Mozykowski, Lowell, Mass; Gertrude M Long, Chelmsford, Mass; Cynthia L Dong and Georgia Dadoly, both of Dracut, Mass; and Mary L Silva, Marion, Mass. Miss Silva has announced her intention of attending New Bedford Institute of Textiles & Technology. Her co-winners will all attend Lowell Technological Institute.

NETF scholarships are awarded to candidates who score highest in Scholastic Aptitude Tests given by the College Entrance Examination Board. The 1955 list of competing candidates shows a vastly increased interest by women students in opportunities for textile school study. Of 54 applicants for this year's competition, 23 were women.

• New Professional Textile Societies in Canada

Formation of The Institute of Textile Science to promote the dissemination and interchange in Canada of knowledge concerning textile science was announced in Montreal last month, while organizational work has started on the formation of an association of textile technicians in Kingston, Ontario, and district.

ITS will draw its membership from scientists in the textile and allied industries who "have a sincere interest in the objects of the Institute" and who are "graduates of a recognized university, or shall have met such requirements as may be set by the Council of the Institute." Associates and Fellows will be admitted.

Both groups will join The Textile Technical Federation of Canada, co-ordinating body for six other groups of textile technicians.

TEACHING THE TEACHERS——Simon Williams, textile research and education consultant, is shown demonstrating a water-repellent resin finish before a group of Massachusetts Distributive Education teachers at their annual Summer Workshop-Conference.

• Wet-Processing Information Presented to Distributive Education Teachers

In a presentation of performance characteristics and values of modern textile dyes and finishes, Simon Williams, research and education consultant to American Cyanamid Co, appeared before a session of the annual Conference-Workshop in Distributive Education which was held last month in Fitchburg, Mass under the auspices of the Massachusetts Department of Education.

Dr Williams revealed how chemical treatments actually work by showing treated garments and textile materials with which every consumer is familiar in before-and-after (washing, exposure to sunlight, burning, drycleaning, etc) condition.

Indicating the limits of added performance gained by use of chemical additives in textile processing, Dr Williams also made concession to the confusion which exists among consumers because of the many names and claims appearing in ads, on labels and in store windows. He noted there are more than 500 copyrighted textile finishes alone being offered to the consumer at the present time.

Dr Williams participated in the Workshop-Conference as part of an education program currently being undertaken by American Cyanamid Company. This program, tied in directly with the chemical manufacturer's system of quality control, is aimed to help the consumer understand what to look for in a textile item and how to obtain it, and to provide retailers with more and more information so as to enable them to render additional service to their customers. Through this program the company hopes to encourage the consumer to look for and demand a label which identifies the finish, provides simple and clear handling instructions, and will reassure the customer that a reputable company stands behind the claims.

• New Pennsalt Executive Offices

Pennsylvania Salt Manufacturing Co has moved its executive offices and headquarters of its operating divisions from the Widener Building to Three Penn Center Plaza, one of Philadelphia's newest and most modern office buildings.

Included in the move, which took place July 1st, are the following components of the consolidated company: Chemical Specialties Division, I P Thomas Division, Industrial Chemicals Division, Sharples Chemicals Division, and Pennsalt International Corporation.

The telephone, LOcust 4-4700, remains the same.

• Brooklyn Poly Offering Course on Ion-Exchange Resins

The Polytechnic Institute of Brooklyn has announced an intensive summer laboratory and lecture course on "Applications of Ion-Exchange Resins and Membranes," to be held during the week of August 22-26, 1955. The course is designed to meet the needs of chemists and engineers who wish to use ion-exchange resins and membranes in practical problems.

Lectures will cover subjects which include the preparation of ion-exchange resins and membranes, selectivity rules, kinetics and column operation, theory and techniques with ion-exchange membranes, applications to separations of inorganic, organic and biochemical materials, preparative chemistry and applications of ion-exchange membranes. Engineering aspects of these processes will also be covered.

Laboratory sessions will deal with the preparation of ion-exchange resins and membranes, and various techniques of column operations.

Prof H P Gregor is in charge of the course. He can be contacted at the Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn 1, N Y.

OBITUARY

EDWIN A RUSSELL

EDWIN A RUSSELL, vice president and director of the Philadelphia Quartz Company, Philadelphia, died June 27 at the Burlington County Hospital, Mt Holly, N J, following a heart attack. He was 66 years of age.

Mr Russell, who lived in Moorestown, N J, was a lifetime member of the Society of Friends. He was educated at Westtown School and Haverford College. He became associated with Haines, Jones & Cadbury in 1915. In 1918 he joined the Philadelphia Quartz Company in a sales capacity. He became sales manager in 1928, director in 1944 and vice president—sales in 1945.

NAMES IN THE NEWS

CARLTON BATES has been appointed president of Solvay Process Division of Allied Chemical & Dye Corporation, effective July 1. He succeeds A B CHADWICK, who has retired after 44 years of service.

Mr Chadwick, a chemical engineering graduate of the University of Wisconsin, was employed by Semet-Solvay in 1911 at its Waukegan, Illinois, plant. In 1915 he became superintendent of Semet's coke plant at Geneva, N Y. Two years later he was transferred to Solvay Process at Syracuse. Mr Chadwick became general superintendent at Syracuse in 1927, assistant director of operations in 1929, and a year later was appointed vice president. He became president of Solvay Sales and executive vice president of Solvay Process in 1945. In 1950 he was appointed president of Solvay Process.

Mr Bates, who has been executive vice president of the Division since 1952, joined Solvay in 1916 as a chemist in the Syracuse plant.

Solvay Process has also named HAROLD M SMITH as assistant purchasing agent, and SOLON D FISHER, technical assistant to the manager of the Ammonium and Potassium Section.

DONALD C SCOTT, technical assistant in the trade analysis section of Du Pont's Dyes and Chemicals Division, retired last month after a 39-year career.

Born and reared in England, Mr Scott received his chemical degree from the London Technical College in 1910. He came to the United States in 1913 and, after working as a chemist for several companies, joined the Newport Chemical Company (later purchased by Du Pont) at Carrollville, Wis, in 1916. Here he was in direct charge of all manufacturing and production operations with the exception of vat dyes. In 1924 he was named sales manager of intermediates, photographics, and special chemicals and continued in a sales capacity after Newport was acquired by Du Pont in 1931. In 1941 he was transferred to trade analysis work and in 1950 was named technical assistant in the trade analysis section.

Six changes in the Technical Department of American Cyanamid Company's Organic Chemicals Division have been announced.

W A RAIMOND has been appointed assistant technical director for the Division. Dr Raimond, with Cyanamid since 1942, was serving as technical director for dyes and related products in the Division's Technical Department when he received his new appointment.

A G HILL, technical director for the Intermediate and Rubber Chemicals Department, has been appointed resident technical director for the Division's Bound Brook, N J, plant, with responsibility for the administration of the Technical Department at Bound Brook. He will also act as development manager for intermediates produced by the Division.

Appointments of development managers for the Technical Department of the Organic Chemicals Division are R C CONN (dyes and textile resins), R H EBEL (rubber chemicals), W P MUNRO (vat dyes and vat dye intermediates) and W E SISCO (coal tar chemicals).

Dr Conn, who joined Cyanamid in 1935, was technical director for the Textile Resins Department when he received his present position. Dr Ebel joined Cyanamid in 1941. Prior to his present position, he was a chief chemist. Dr Munro, who has been a departmental chief chemist since 1949, came to Cyanamid in 1933. Mr Sisco started with Cyanamid at its Stamford Research Laboratories and was transferred to the Organic Chemicals Division in 1946 as a chemist.

Franklin

Dourdeville

Shepard

RICHARD C FRANKLIN and THEODORE A DOURDEVILLE have been elected vice presidents of the David Gessner Co, Worcester, Mass, textile finishing machinery manufacturers.

Mr Franklin has been with the firm since 1947, most recently as a sales engineer.

Mr Dourdeville, with Gessner since 1948, is in charge of research and development.

NORMAN A SHEPARD has retired from his post as chemical director of American Cyanamid Company. During his 42-year career in the chemical industry, he became widely known in industrial, governmental and academic circles.

He began his career in 1913 as an instructor in chemistry at Yale University following his graduation from that institution, became assistant professor four years later, and in 1919 joined Firestone Tire and Rubber Company as director of organic chemical research. In 1925 he was named director of chemical research.

Dr Shepard joined Cyanamid in 1936 as director of technical service and was named to his most recent post in 1941.

CLIFFORD L SAYRE, development chemical engineer for Becco Chemical Division and other chemical divisions of Food Machinery and Chemical Corporation, has been appointed Brigadier General, U S Chemical Corps Reserve. He becomes the first reserve officer to attain the rank of General in the Chemical Corps.

S B SCOTT has been named director of sales, and M A THOMPSON, eastern sales manager for Wyandotte Chemicals Corporation's Michigan Alkali Division.

Through the general product managers Mr Scott will be responsible for sales aids in the form of promotional plans and programs to supplement and facilitate direct selling efforts. He will collaborate with other divisions of the company on all matters pertaining to the sales of Wyandotte's products. Mr Scott joined the company's New York office in 1942 and was named manager of that office eight years ago.

Mr Thompson, who will manage the company's New York office, has been with Wyandotte since 1943. He previously managed offices in Detroit and Chicago. More recently he has been manager of field sales for the Corporation.

Sayre

Scott

Thompson

Morehouse

Castka

Gavitt

WALTER B MOREHOUSE has been appointed general sales manager of the Industrial Division of the Nopco Chemical Company.

In his new assignment, Mr Morehouse will supervise the sales activities of the following production divisions of Nopco: Textile Chemicals, Textile Fibers, Paper Chemicals, Specialties Sales, and Tanning Oils. He will also be in charge of the Sales Division of the Metasap Chemical Company, a subsidiary of Nopco which produces insoluble metallic stearates.

Mr Morehouse has been associated with Nopco since 1940, and was named an assistant vice president of the company in 1953. In addition to his new assignment, he will continue as manager of the Paper Chemicals Division.

ALBERT CASTKA has joined the technical staff of Metro-Atlantic, Inc. He will be in charge of the newly organized laboratory and office in Fair Lawn, N J.

Mr Castka spent 16 years with General Dyestuff Company doing technical sales work on all phases of dyeing and printing, and 6 years with Allied Textile Printers as chief chemist and plant trouble shooter.

Crown Chemical Corp, Providence, R I, has named ROY H GAVITT technical sales representative, covering parts of Rhode Island, New York, northern New England and Canada.

Mr Gavitt has been associated with Bradford Dyeing Association and Verney Corporation, where he most recently served as superintendent of dyeing and finishing.

He will make his headquarters in Peterborough, N H.

ROBERT R BARRINGTON, sales representative for the Geigy Dyestuffs Division of Geigy Chemical Corporation, resigned his position with the corporation on May 31, 1955.

He has been replaced by ERIC A SCHLAGINHAUFEN, who has been transferred from the Metropolitan New York area.

LELAND A ENBERG, formerly on the staff of McKesson & Robbins, Inc's chemical headquarters in New York, has been appointed district manager at the firm's newly established chemical department's district office at 805 Peachtree St, NE, Atlanta, Ga.

WALTER H HINDLE, associate director of research in charge of dyeing and finishing, The Chemstrand Corporation, has returned from England following a tour of English textile mills which are working with Acrilan acrylic fiber.

In addition to conferences with knitters, weavers, and dyers, Mr Hindle gave a series of talks on dyeing procedures for Acrilan in both England and France, including a lecture before The Society of Dyers and Colourists.

THOMAS R BARAVALLE, formerly with Barlow Chemical Co, has joined E F Drew & Co, Inc in a technical sales capacity for the Textile Chemicals Department. He has been assigned to the metropolitan New York area.

TECHNICAL LITERATURE

(It is understood that the following literature is available from the sources listed in italics).

ACOUSTICA MODEL DR-100 ULTRASONIC VIBRATOR——*Acoustica Associates, Inc, Shore Rd, Glenwood Landing, N Y*——Process engineers will be interested in this vibrator for agitation, emulsification, dyeing, scouring, and bleaching.

A photograph of the ruggedly constructed, portable, one-knob control unit, an explanation of its above-audibility sound wave principle of operation, and complete specifications of the DR-400 are presented.

AEROFLOC® REAGENTS——*American Cyanamid Co, Mineral Dressing Dept, 30 Rockefeller Plaza, New York 20, N Y*——Cyanamid has made available new literature on the Aerofloc Reagents, synthetic polymers which are useful in flocculating finely divided solids in aqueous suspensions. Millmen combatting the problem of stream pollution will be interested in these brochures.

BECKMAN AUTOMATIC INFRARED SPECTROPHOMETER——*Beckman Division, Beckman Instruments, Inc, Fullerton, Calif*——Bulletin 410 describes in 4 pages the Model IR-2A, a high-performance, low-cost instrument for research and quantitative analysis. With emphasis on performance, the bulletin gives full specifications and exact reproductions of the transmittance curves produced by the IR-2A. Included is the spectrum of polystyrene, an accepted test for infrared instruments.

"CHEMICAL MARKETING ABSTRACTS"—1st ANNUAL INDEX——*Foster D Snell, Inc, 29 W 15th St, New York 11, N Y*——This first annual index to "Chemical Market Abstracts," a monthly literature research service covering market news and statistics for the chemical industry, covers the year 1954. The volume contains more than 22,000 separate entries.

Information abstracted during the year is indexed under the following major headings: company names, foreign countries, trade-marks, and industrial uses of chemicals. Further listings offer references to domestic and foreign patents in the chemical field and to unit-consumption factors as reported in the trade press.

Listings under the Companies heading total about 11,000 and refer to approximately 5,000 companies and organizations, both domestic and foreign. This includes more than 600 references to U S Government agencies.

The Foreign section covers 182 different countries and geographical areas. About one-fifth of the more than 6,000 entries refer to Canada and the United Kingdom. West Germany has 350 entries, and Russia has 58.

Material in the Trade-Mark section refers to about 2,500 chemical products newly developed or marketed during the year. Listings of New Uses of Chemicals total about 2,000, Unit-Consumption Factors over 200, and Patents over 150.

COMPARATIVE PROPERTIES OF PROTECTIVE COATINGS——*The Atlas Mineral Products Co, Mertztown, Pa*——This 19-page report by Gerald F Gilbert, Jr, contains information on 14 types of coatings used to protect equipment, walls, beams and ceilings in plants where fumes and industrial atmospheres cause corrosion. Included in the report is physical and chemical data and a 3-page section on the selection of coatings. A chart in the presentation shows comparative value of the various coatings as protection against weather, impact, abrasion, heat, water and various chemical groupings.

FASHION SHADES ON PERLON STOCKINGS——*Nova Chemical Corp, 147-53 Waverly Pl, New York 14, N Y*——This new, special pattern card for hose dyeing has been brought out by the Badische Anilin- & Soda-Fabrik AG, Ludwigshafen a Rhein, Germany. The fashion shades have been dyed with the Perlitan dyestuffs. This pattern card illustrates the shades of the most popular Perlitan dyestuffs for hose dyeing as type dyeings in 2 different depths of shade and gives details of the most important fastness properties. In addition, the pattern card shows 63 fashion shades dyed on hose.

PILATE FAST DYESTUFFS ON WOOL——*Nova Chemical Corp, 147-53 Waverly Pl, New York 14, N Y*——Besides comprehensive descriptions of the dyeing processes, this new loose-leaf pattern card, which has been brought out by Badische Anilin- & Soda-Fabrik AG, Ludwigshafen a Rhein, Germany, contains dyeings of the individual Pilate fast dyestuffs in 2 and 3 depths of shade. In addition, more than 100 fashion shades on wool gabardine are illustrated with recipes.

SELECTED SCIENTIFIC AND ENGINEERING TABLES AND DATA——*United States Testing Co, 1415 Park Ave, Hoboken, N J*——Issued in commemoration of U S Testing's 75th anniversary, this 112-page paper-bound volume contains selected Chemical & Physical, Engineering, Plastics, Bacteriological, Leather, Psychometric and Textile tables and charts.

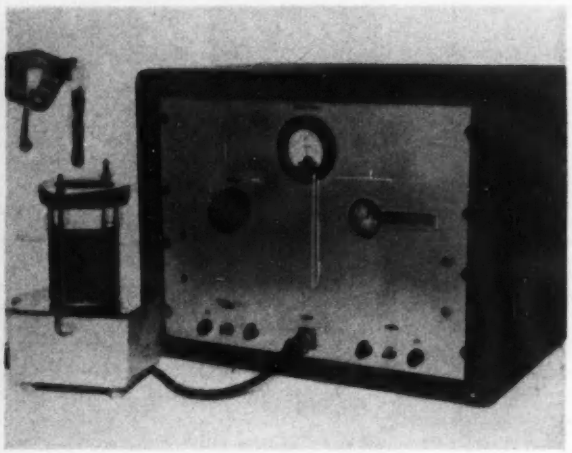
The new booklet, designed as a reference handbook for technicians in these many fields, provides standard formulas, charts and definitions in brief and concise form.

SEQUENCING TIMING CONTROL——*Industrial Division, Minneapolis-Honeywell Regulator Co, Philadelphia 44, Pa*——Instrumentation Data Sheet No. 11.12-1 discusses methods for operating process equipment in accordance with increments of total flow or weight measurements. Sections of this illustrated, 4-page brochure discuss the following: Integrators are the Connecting Links, Impulse Counter Method for Batch Processes, Continuous Timer Method for Continuous Processes, Sampling Product Streams, Choosing between the Two Methods, and Honeywell's Standards.

Also included is a page devoted to specifications of Honeywell's flow and weight recorders.

THE WHY OF TEXTILE STANDARDS——*Mellon Institute, 4400 Fifth Ave, Pittsburgh 13, Pa*——This reprint from *Department Store Economist* comprises three articles by Jules Labarthe, senior fellow at the Mellon Institute. They are: 1) Some Causes of Consumer Complaints of Fabrics; 2) The Store Buyer vs the Consumer; and 3) Buying for End-Use Requirements.

At the A C Lawrence tannery in Peabody, Mass, a skin treated with Quilon chrome complex is checked for color constancy. A water solution of the greenish-blue liquid is applied in the dye-processing step in place of the fat liquors normally used.



DR-400 Ultrasonic Vibrator

• Drycleanable Suedes Now Attainable

Suede leather garments that are water resistant and can be drycleaned by ordinary methods are now available as the result of a process developed by the Du Pont Company's Grasselli Chemicals Department. The process employs Du Pont's G-942 tanning agent and Quilon chrome complex.

A striking aspect of the development is the water resistance given to suede leather. It is claimed that the wearer of a suede sports jacket treated with Quilon may be caught in a sudden shower without fear of rain penetrating the garment, although the surface of the garment may become moist. The water resistance is reportedly achieved without altering the ability of the leather to breathe, an important factor in garment comfort.

In the new process, Quilon replaces lubricating agents traditionally used in producing suede leather. It is said to anchor in the microscopic fibers of leather and will not leach or spread out in drycleaning. As a result, garments made of the new suede leather may be cleaned by ordinary commercial methods available in all parts of the country, without loss of texture, flexibility, or pliability, and without change of color, it is claimed.

The G-942 tanning agent is said to impart plumpness and silkiness of nap to the suede leather surface and thus enhance the beauty of the finish.

Quilon is applied in a water solution in place of the fat liquors normally used before or after the application of dyes. If applied after the coloring operations, it is made at 100° F with a recommended concentration of 10 to 20% based on the dry or crust weight of the leather to obtain sufficient lubrication and water-resistant properties. If a double wet-wheeling operation has been used to avoid crusting, 7% Quilon based on wet weight is recommended. Since the Quilon is greenish in color, the color of the float indicates the degree of exhaustion of the Quilon into the leather.

Suede garments bearing the Quilon label were first on the market in small quantity in December 1954, and retail sales are said to have increased rapidly during the 1955 spring season. It is anticipated that many nationally promoted lines will be in stores this fall.

Research and development are continuing in the glove field where drycleaning and washability are important. In addition, it is expected that this development will be carried into the field of side leather and certain sole leathers to improve water resistance.

• Model DR-400 Ultrasonic Generating Equipment

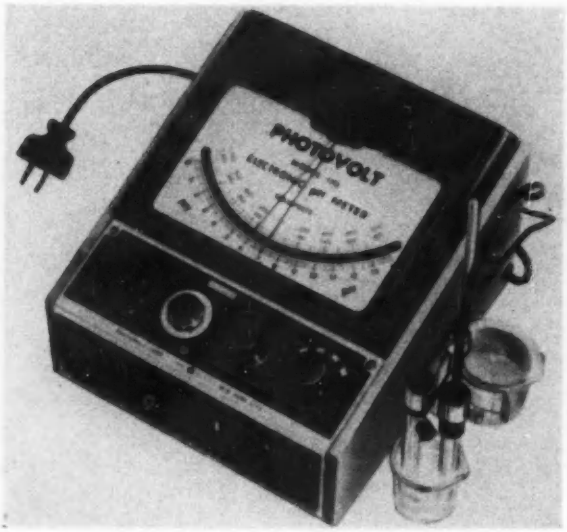
Utilizing highly efficient low-frequency ultrasonic vibrations, the new Model DR-400 Ultrasonic Generating Equipment announced by Acoustica Associates, Inc, 421 Seventh Avenue, New York 1, is reported to be well suited for ultrasonic dyeing and wet-finishing investigation of chemicals or fibers.

Recent work in cellulose, rayon and other synthetic fibers is said to have indicated far better dyeing results, particularly with such difficult-to-dye materials as Orlon, and the time required to achieve level and complete dye penetration and dyebath exhaustion at less than boil temperature was reportedly reduced in some cases to 1/6th that of high-temperature dyeing. The manufacturer suggests that the new ultrasonic device might point the way to savings in capital equipment, labor, steam and chemicals while raising production levels.

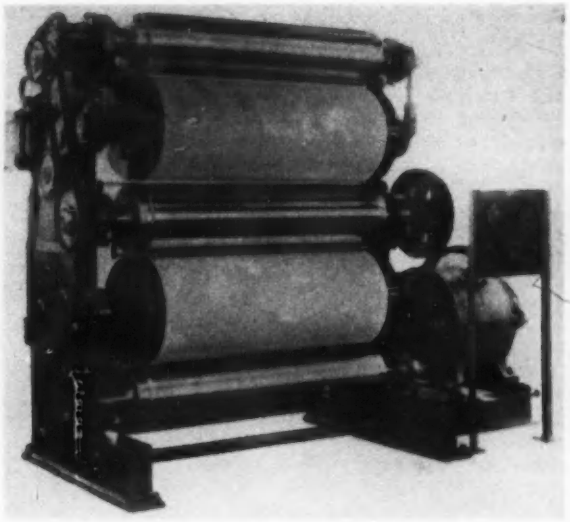
In operation, swatches or skeins are lowered into a dye-filled jar of the DR-400. The jar is secured to a rugged magnetostriction-type transducer, which develops intense vibrations at a frequency just beyond hearing range, thereby creating copious cavitation in the liquid. Millions of vapor bubbles are created and collapsed continuously. The pressures released by the collapse of the cavitation bubbles break up agglomerates in liquid vehicles and produce very fine, uniform dispersions. Dye is shot into the fabrics with tremendous force, it is reported, without any mechanical effect on the fiber, yarn, or cloth construction.

It is pointed out that groups of these transducers can be placed in existing dye jigs for production use and can be energized from economical motor-generator sets. Applications in the textile field include rinsing, scouring, bleaching, sulfuric acid carbonizing, fulling, resin impregnation, mercerizing, and other wet-finishing operations.

The larger production-size models are available in power requirements up to 150 KW. Power requirements are determined by the size and volume of the bath, the number of transducers that will fit and do the job, etc. (Each transducer takes 400 watts.)



Photovolt Model 110 Line-Operated pH Meter



McKiernan-Terry Multiple-Roll Calender

• Line-Operated pH Meter Model 110

The Photovolt Corporation, 95 Madison Avenue, New York 16, N Y, has placed on the market its Line-Operated pH Meter Model 110. This instrument incorporates a large-size indicating meter of 7" scale length covering the entire pH range from 0 to 14 without switching and without reversal of the pointer travel. Model 110 is intended mainly as a laboratory-type instrument, but can be furnished in a portable shape with baseboard and carrying cover. The available accessories include a swing-arm adapter for immersing the electrodes.

Model 110 reportedly incorporates the most recent advances in electronic tubes and circuits. It is said to be perfectly stabilized and can be used on voltages from 80 to 260 (40/60 cycles AC). It reportedly offers an accuracy of 0.02 pH unit.

The pH Meter Model 110, which sells for $185.00, is fully described in Bulletin No. 105, available from Photovolt Corp on request.

• Ammonia Leaks Test Paper Device

A new pocket-size device for detecting ammonia leaks is being offered to ammonia users by Nitrogen Division, Allied Chemical & Dye Corporation.

The device is a booklet containing paper strips impregnated with phenolphthalein. By tearing a strip from the book, saturating it with water and holding it near suspected leaks, the user can detect the presence of ammonia when the color of the paper turns red.

The device may be obtained free of charge by writing Nitrogen Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N Y.

• Improved Multiple-Roll Calenders

The Textile Machinery Division of McKiernan-Terry Corporation has announced the development of new designs of open side, pneumatically loaded multiple-roll calenders with several distinctive features, including versatility which enables the calenders to be used for rolling, friction, schreiner and embossing services; compactness which permits their use in restricted head room and limited floor space; and sturdiness.

The calenders reportedly include provision for turn down of the filled rolls from 24-inch diameter to 18 inches, less down time for roll turning, accurate parallel alignment of the rolls, convenient and safe accessibility of the rolls which may be removed without disturbing and adjacent roll, and air-cushioned loading.

These calenders are built in capacities from 15 to 60 tons, in 3-, 4- and 5-roll types. Further information on the new design can be obtained by addressing the Textile Machinery Division of McKiernan-Terry Corporation, 80 Richards Ave, Dover, N J.

• Nekanil TD

Badische Anilin- & Soda-Fabrik AG, Ludwigshafen a Rhein, Germany, has placed on the market a new auxiliary under the name Nekanil TD, which is designed for the after-washing of all types of printed goods.

The manufacturer states that the good stability to the metallic salts used in printing, the pronounced colloid-protective properties and the good detergency of Nekanil TD ensure faultless and even results in washing.

• Higher-Purity Acetoacetarylamides by a New Process

An improved process for the production of higher-purity acetoacetarylamides was recently announced by Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation. The new process is said to give superior products for use in the manufacture of organic pigments such as Hansa, benzidine yellows.

These higher-purity acetoacetarylamides reportedly wet-out more quickly, are easier to handle, give cleaner pigment tones, and have a low toxicity.

Copies of technical bulletin F-8259 describing the various arylamides may be obtained from Carbide and Carbon Chemicals Company, 30 East 42nd Street, New York 17, N Y.

• Supronyx

Onyx Oil & Chemical Co, Jersey City, N J, has announced the development of Supronyx, a new detergent which is said to possess unusual versatility and effectiveness.

A modified sodium alkyl sulfate, neutral, mild and anionic, the new Onyx surfactant is said to be possessed of outstanding soil-carrying properties nonetheless. It reportedly has proven itself equally and especially useful for its foaming, wetting, emulsifying, penetrating and detergency properties.

Actual production reportedly has proven Supronyx efficient in a variety of uses, e g, as a scouring compound and dye assistant for wool, synthetics and silks; with alkaline builders, on cottons; etc.

Supronyx is described as a liquid compound, easily dissolved, with excellent resistance to hard water, and exceptional foam stability. It reportedly rinses out quickly and thoroughly and is gentle and non-irritating.

• New Interchem Dyes

Interchemical Corporation, Textile Colors Division, Hawthorne, N J, has introduced two new dye series—the Interchem® Triacetate Dyes, comprising five dyes for fast-color dyeing of Arnel, and the Interchem® Acetate GSF Dyes, gas-fast and sun-fast acetate colors.

The dyes of the Triacetate series are said to possess excellent fastness to washing, light, and sublimation. They are useful alone for producing full, bright shades and in combinations with one another for producing a wide range of popular mode shades, it is reported. Selected Interchem Triacetate Dyes are also reported to be suitable for application printing. The dyes in this new series include Interchem Triacetate Yellow GSF, Interchem Triacetate Scarlet GSF, Interchem Triacetate Red GSF, Interchem Triacetate Blue GSF, and Interchem Triacetate Green-Blue ALF-40.

The dyes in the Acetate GSF series were developed specifically to provide excellent fastness to both gas fading and sunlight on acetate. The dyes available now include Interchem Acetate Blue GSF, Interchem Acetate Red GSF, Interchem Acetate Scarlet GSF, and Interchem Acetate Yellow GSF. All are reported suitable for dyeing or printing acetate fabrics in gas-fast, sun-fast shades from pastels to blacks. They are reported to be especially useful for dyeing or printing dress goods, suitings, sportswear, beachwear, and other materials requiring a high degree of fastness. The new Acetate GSF series has been found suitable also for Arnel, Dynel, and Acrilan. The Blue GSF and Yellow GSF can be employed on Dacron.

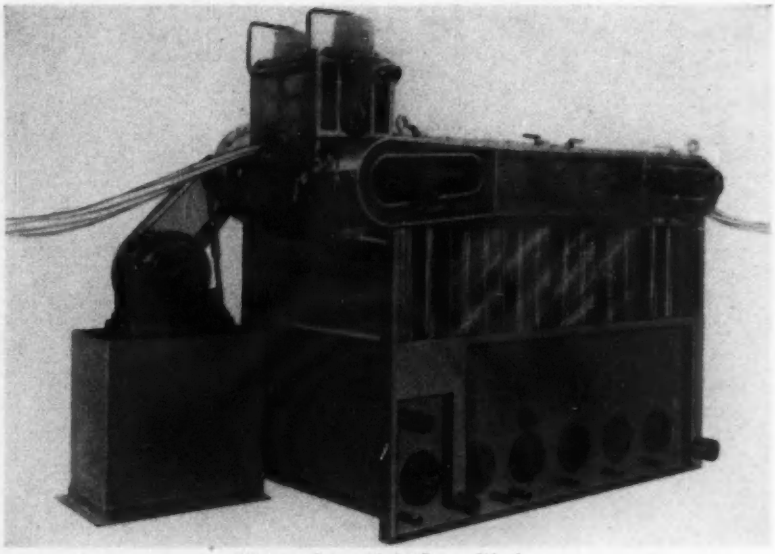
• Melltone RH

Melltone RH, a nonionic softener which has emerged from the research laboratories of Crown Chemical Corp, Providence, R I, is being enthusiastically received for use in thermosetting-resin baths as a softener and lubricant, it is reported.

The product is a fluid which is said to be readily dispersible in water at 80-90° F. It reportedly is completely compatible with those products normally encountered in dyeing and finishing operations, and, being nonionic, it has no deleterious effect on light fastness. Crown points out that the product can be applied on high-speed equipment and closed pressure machines with an absence of foam.

Melltone RH is said to be outstanding as a straight finish since there is no problem of color reversion or odor development due to aging. Resultant finishes are claimed to possess excellent antistatic properties.

Other reported features of the product are its high resistance to scorching, and its ability to promote maximum fiber lubrication thus facilitating high-speed sewing and minimizing fusing of fabrics during high-speed cutting operations.



Wiesner-Rapp Multi-Stage Washer

• Multi-Stage Tension-Control Washer

A totally enclosed, high-speed, compartmented washer, known as the Multi-Stage, has been developed by the Wiesner-Rapp Co, Inc, Buffalo, New York. This washer will process a wide vairety of fabrics in the rope form.

Some of the features of the Multi-Stage enumerated by the manufacturer are as follows: 1) tension control; 2) high-speed production up to 300 ypm; 3) versatility; 4) low water consumption; 5) made in various sizes; 6) self-contained all-stainsteel construction; 7) easily threaded; and 8) sets on floor—no pit needed.

As the Multi-Stage is made up of a number of stages or compartments it is used for soaping, washing, chemical treating or a combination of these processes. Rider squeeze rolls are mounted on top of upper main rolls at desired locations to limit the amount of liquor carried by the cloth from one stage to another.

The partitions separating the stages are solid and extend from bottom of the tub to the top enclosure. Slots located at alternate ends of these partitions are designed to ensure counterflow of liquor for greater efficiency and a more uniformly clean fabric.

All top rolls are driven with the entering roll driven by an adjustable V belt unit, as is the exit squeezer, making possible tension control of all strands in the washer while in operation.

The Multi-Stage has been mill tested for over two years and is now being manufactured for bleaching-range operation and single-unit processing.

• Sipex 7W

A new modified alcohol sulfate, Sipex 7W, which reportedly possesses outstanding grease-emulsifying properties, is being offered by American Alcolac Corporation, 3440 Fairfield Road, Baltimore 26, Md.

Sipex 7W is said to have excellent foaming properties, especially in hard water. An unusual feature is that it retains most of its use as a bubble-bath ingredient. Its uses include scouring dyed or printed fabric.

Sipex 7W is now available in multi-drum quantities. A data sheet, sample and additional information are available from Alcolac's Development Department.

• Silicures

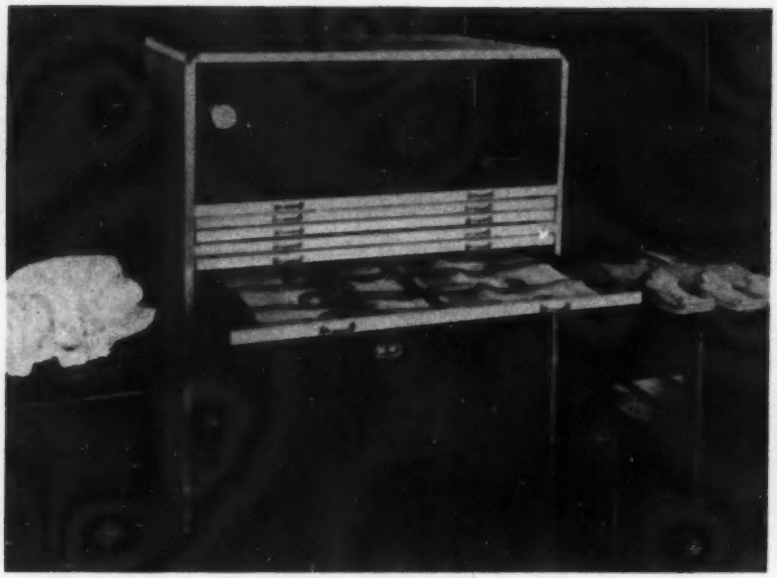
Nuodex Products Co, Inc, a subsidiary of Heyden Chemical Corporation has introduced a line of seven metallic soaps for curing silicone resins used in textile applications. Called Silicures, they are convenient solutions of tin, zinc and zirconium organic compounds designed to fit the individual requirements of a wide range of treating systems.

Literature is available giving specifications, application data and suggested formulas. Address requests to Nuodex at 14 Magnolia Avenue, Elizabeth, N J.

• Dibutyl Fumarate Available from Borden's in Commercial Quantities

Dibutyl fumarate is being made available in commercial quantities for the first time, according to an announcement by the Borden Company's Chemical Division. At the same time, Borden's announced that it has begun marketing fumaric acid. Both of these chemically active compounds are being produced for Borden by Bzura, Inc.

Further information and samples of these compounds may be obtained by contacting The Borden Company Chemical Division, 350 Madison Avenue, New York, N Y.



Turbo Boardless Dryer

• Boardless Dryer

Turbo Machine Company, Lansdale, Pa, has introduced the Turbo Boardless Dryer for manufacturers who want a substitute for final boarding. It is said to offer economies inherent in this method of finishing, while giving stockings a softer hand and more pleasing finish than is customarily achieved without the use of boarding forms.

Drying is done in a six-drawer cabinet. Each drawer is loaded and unloaded in rotation, thereby making the operation a continuous one. This arrangement reportedly allows for a comparatively long drying cycle per drawer with no time lost waiting for drying to be completed. Comparatively low drying temperatures and gentle circulation of air through the drawers are added features. Turbo points out that stockings remain smooth and unwrinkled, ready for pairing and boxing.

Production figures on the new dyes show up to 500 dozen pairs of stockings in 8 hours. Machine capacity is 18 dozen pairs — 3 dozen in each of 6 drawers. Steam required is approximately 15 psi; floor space, 12 square feet. It is claimed that steam consumption is low, and there are no appreciable heat losses.

• Chemigum Latex 236 and 246

Two new small-particle-size nitrile latices are now being produced by the Chemical Division of The Goodyear Tire & Rubber Company, Inc, Akron, Ohio.

The latices, designated as Chemigum Latex 236 and 246, are said to make possible greater coverage and more intimate contact with individual fibers and composition of materials. A unique combination of small particle size with very high mechanical stability properties are reported to be inherent in both latices. Average particle sizes of the latices is 500 Angstroms.

Chemigum Latex 236 has a high acrylonitrile content and is recommended by Goodyear for specialty applications where maximum oil resistance and toughness is required.

Chemigum Latex 246 is a medium acrylonitrile polymer which can be used economically for more general purpose type applications.

• Dexolene G, B and MTV

A series of three high-speed wetting and rewetting agents, including one with nonfoaming characteristics, was recently announced by Dexter Chemical Corp, New York.

Composed of solutions of sodium dioctyl sulfosuccinate, Dexolene G, B and MTV (nonfoaming) are said to be especially effective as wetting-out assistants and dye levelers in package and skein dyeing of cottons, rayons and synthetics; assistants in finishing baths to promote thorough penetration of finish; penetrant and dispersing agents for vat dyes in pigment padding; and rewetting agents for goods which are to be preshrunk or which are to be padded after drying.

In exceptionally high-speed processing, it is claimed, Dexolene MTV prevents the buildup of foam and is therefore recommended in place of Dexolene G and B for this type of work.

An interesting factor about this type of wetting agent, it is pointed out, is that only exceptionally small percentages are needed. Dexter recommends 0.025 to 0.1% on the weight of the goods for most operations.

• New Application for Prym Resins

New standards of excellence for the finishing of viscose rayon and viscose-blended fabrics reportedly have been created by a new application of Prym N and Prym CR resins when used in combination with the Avcoset textile-finishing formula.

According to H C Whittemore, general manager of the Warwick Chemical Division of Sun Chemical Corporation, the addition of Warwick's Prym N or Prym CR, or both, to the basic Avcoset formulation results in the creation of three new properties: durable crease resistance, durable retention of appearance and other aesthetic features, and the ability to vary the hand of the fabric to meet the varying specifications of garment manufacturers. The Avcoset formula of American Viscose Corporation has provided a high degree of shrinkage control and chlorine-bleach resistance, and of durability of both to washing. The addition to the basic formula of the aforementioned Prym resins is said to enhance these qualities as well.

Prym N and Prym CR are two of the five Prym resins developed and manufactured by Warwick Chemical. Prym N is utilized in a variety of different processes, including durable nylon stiffening, stabilization and mechanical finishes on cotton, and stabilization and crease resistance of cellulosics and synthetic blends. Prym CR is equally versatile in its own field of cottons. When applied to cotton fabrics, Prym CR imparts shrinkage, crease and chlorine resistance, as well as improved hand.

In the basic Prym-and-Avcoset formulations, Prym N is included when a firm hand is desired, while Prym CR is used to obtain a soft hand. When a shirting hand is wanted, both Pryms are included in the formulation. A suggested formula to impart a firm hand to an all-viscose fabric includes:

7.5%	Avcoset WS (water soluble)
10%	Formaldehyde (37% strength)
5%	Prym N
3%	Diglycolic acid

For a viscose-blended fabric, minor modifications in the formula are necessary, but similar properties reportedly are produced in the fabric.

When properly processed and dried, Mr Whittemore reported, viscose and viscose-blended fabrics treated with basic Prym-and-Avcoset formulas have shown shrinkage control of one percent or less through 25 washes at the boil, crease angles of 130 degrees or higher, and loss of tensile strength by chlorine degradation of less than five percent.

Fabrics must contain a minimum of 50 percent American Viscose yarn or fiber and must meet Avisco color fastness requirements in order to be eligible for Avisco Integrity identification.

• Latest National Colors

National Aniline Division, Allied Chemical & Dye Corp, 40 Rector St, New York 6, N Y, has announced several new additions to its line as follows:

National Niagara Copper Black Brown is a recent addition to National's line of nondusting direct dyes. This product is seldom employed as a simple direct dye, but is usually aftertreated with copper-resin compounds. When aftertreated with urea-formaldehyde and National Naccufix, it produces black-brown shades on cotton and rayon, with appreciably heavier and redder shades obtained on rayon. It possesses moderate light fastness; good fastness to perspiration, acid and alkali; very good fastness to washing; and excellent fastness to rubbing, sea water and water. This product produces a very popular shade and is also suitable for shading purposes in dark colors.

National Solantine Green BL, one of the latest additions to National's line of nondusting, fast-to-light direct dyes, possesses excellent solubility and yields moderately bright shades of green on cotton, viscose rayon and leather. It exhibits very good fastness to light, rubbing, stoving, dry and wet heat, drycleaning, and perspiration; and excellent fastness to water and sea water. This product is suitable for coloring cotton carpet yarns, hosiery, bathing suits, upholstery and materials to be rubberized.

National Carbanthrene Black Brown VA Paste is the latest addition to National's expanding line of anthraquinone vat dyes. It produces, on cotton and rayon, blackish brown shades of maximum fastness to light and excellent fastness to most wet processing including boiling soap and stoving. It reduces readily at 120° F in a weakly alkaline bath to a red violet leuco and is usually dyed at the same temperature. This dye is well suited for application in pressure-dyeing equipment and may also be applied by the various pigment-impregnation methods. It is recommended for coloring materials that are to be resin finished for crease resistance and for the production of materials that must possess exceptional fastness to light and commercial laundering.

National Carbanthrene Printing Black BBD Double Paste is the latest addition to National's expanding line of anthraquinone vat printing pastes. It is a nondrying homogeneous paste, free from grit, producing jet black shades on cotton and rayon. It possesses maximum light fastness and very good to excellent fastness to most wet processing. The outstanding characteristic of this dye is its very good fastness to rubbing. This product is recommended for the production of printed materials that must possess exceptional resistance to light and commercial laundering.

• New Neutral Wool-Scouring Process

A new neutral wool-scouring process developed by textile chemists of Rohm & Haas Company and involving no alkali or salt of any kind is finding widespread acceptance in the trade, according to W J Thackston, Jr, sales manager of the company's Textile Chemicals Department. The process is based upon a detergent which adds a new name to the company's line of surface-active agents, Lavepon WS-1.

As the principal advantages of the process, Thackston cited the following: significant improvement in color and loft of scoured wool; increased staple length of fiber due to elimination of alkali damage; costs comparable to or lower than an alkali scour; greater production per train because of the faster drying rate the process makes possible.

"Since this process was developed several months ago," said Thackston, "literally millions of pounds of wools of many different types have been scoured with Lavepon WS-1, using a completely neutral scour with no alkali or salt added.

"The wools scoured include carpet wools, pulled wools, apparel wools of several different grades, mohair, alpaca, and cashmere. This wide variety of wools has been scoured under many different scouring conditions both in commission houses and in plants owning, controlling, and processing their own wool. Results have been excellent without exception."

• Wicaset 462

Wica Chemicals, Inc, Charlotte, N C, has begun production of a new emulsion polymer, Wicaset 462.

William Caldwell, president of Wica, has described the product as a nonionic polyvinyl acetate that is highly compatible with a wide variety of softeners, finishes and thermosetting resins.

The manufacturer recommends Wicaset 462 wherever stiffening, sizing or bondage is desired. "The resistance to light and heat and fine mechanical stability of this product are excellent," Mr. Caldwell said.

As an additive or separate finish, this product may be applied with conventional equipment. According to Wica, high-temperature drying is not required to obtain fine results.

The fine particle size of Wicaset 462 adds hand control of finished goods and minimizes marking and sticking, it is claimed. The product is expected to be of special interest in coatings and impregnations for bonding cotton and synthetic mixtures.

Extreme water resistance of the dried films points to unusual coatings possibilities, Mr Caldwell added.

• New Hydrogen Peroxide Continuous Bleach Method

Becco Chemical Division, Food Machinery and Chemical Corporation, has announced an important new method for continuous hydrogen-peroxide bleaching of textiles, which is said to completely eliminate the possibility of silicate scale formation in the J Box and auxiliary equipment.

In the new Becco method, the hydrogen peroxide bath is stabilized and made alkaline by the use of phosphates and other nonscale-forming chemicals. Other than this, little alteration of present conventional continuous-bleaching equipment or the method of its operation is entailed.

The new continuous bleaching method reportedly has been in successful commercial use in one of the largest bleacheries in the United States for over a year.

Becco is making the method, for which a patent application has been filed, available to the textile industry under license on a non-exclusive basis.

GENERAL CALENDAR OF COMING EVENTS

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

National Convention—Sept 26-28, Lake Placid, N Y.

GARMENT DYERS GUILD OF AMERICA

Sept 9-10, Loshi Dye Works, Roanoke, Va.

THE FIBER SOCIETY

Fall Meeting—Sept 8-9, Massachusetts Institute of Technology, Cambridge, Mass; Spring Meeting—May 2-3, The Clemson House, Clemson, S C.

NATIONAL COUNCIL FOR TEXTILE EDUCATION

October 17-19, The Larches, Hopedale, Mass.

INTERNATIONAL WOOL TEXTILE RESEARCH CONFERENCE

September, 1955—Sydney, Melbourne, and Geelong, Australia.

NATIONAL COTTON COUNCIL OF AMERICA

1955 Chemical Finishing Conference—Sept 20-21, Chalfonte-Haddon Hall, Atlantic City, N J; 7th Annual Cotton Research Clinic—Feb 15-17, Pinehurst, N C.

NATIONAL INSTITUTE OF DRYCLEANING ALUMNI SOCIETY

Annual Reunion—August 12-14, NID and Shoreham Hotel, Washington, D C.

PHI PSI FRATERNITY

Annual Meeting—April 19-21, Alabama Polytechnic Institute, Auburn, Ala.

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION

Sept 14, Oct 11, Nov 9 (Hotel Commodore, New York, N Y).

Calco

Dyelines

AMERICAN Cyanamid COMPANY DYESTUFF DEPARTMENT BOUND BROOK, NEW JERSEY

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Corduroy...

New Uses Demand All Around Fastness

In addition to its great popularity in sportswear, boys' wear and women's wear, corduroy is now in big demand for the home furnishing field—bed spreads, slipcovers and draperies, as well as upholstery fabrics. Enduring colors of all around fastness are imperative and the extensive line of Calco finely dispersed vat dyes provides a full range of shades for all methods of application. Some of these widely used dyes are exclusive with American Cyanamid Company. Especially recommended for corduroy:

- Calcosol Fast Yellow Paste
- Calcosol Fast Yellow GL Paste
- Calcosol Golden Orange 3G Paste
- Calcoloid Copper Brown Double Powder
- Calcosol Jade Green N Supra Double Paste
- Calcoloid Brown R Double Powder
- Calcosol Yellow PG Double Paste
- Calcosol Gray 2G Double Paste
- Calcosol Olive Green BN Double Paste
- Calcoloid Blue BLNS Double Paste
- Calcosol Navy Blue Paste
- Calcosol Violet BN Ex. Paste
- Calcoloid Black BNS Double Paste

No matter what dyeing method you employ, our technicians are highly qualified and will gladly work with you. Just give us a call.

Phone operators at Bound Brook handle an average of 4,000 calls daily.

Colorists Endorse Consistent Quality of Calcosol and Calcoloid Printing Vats

Tinctorially Strong; Bright in Shade; Popular in Demand

Many years' experience with Calco printing vats has proved to colorists that they can rely on these popular dyes for uniform quality from beginning to end of the barrel—also they value consistent tinctorial strength month after month—assuring production runs identical in color to sample patterns. In addition, of course, Calco printing vats are known to be smooth, free-flowing; they do not dry, flake, or settle in the drum. All these qualities, combined with excellent fastness properties, add up to maximum performance—which recommends Calco printing vats for draperies, table cloths, bedspreads and other uses where bright or heavy shades are desired. Among the most popular printing vats in the Calco line:

Calcoloid Brown RRWP Paste
Calcosol Printing Orange RYW Paste
Calcosol Pink FFWP Paste
Calcosol Printing Scarlet 2GW Paste
Calcosol Violet 6RP Paste
Calcosol Golden Yellow GK Paste

These are only a few of the extensive and reliable line of Calco printing vats. Whatever your dyestuff needs—call Cyanamid.

Calcocid Alizarine Blue A2G

a Versatile, Clean Bright Blue for Wool or Wool-Nylon Unions

This *bright green shade of blue* offers good fastness to light, alkali and perspiration, plus excellent working properties. It works well in combination with other wool dyes and is often the blue element in mode shades.

Not unduly sensitive to pH changes, Calcocid Alizarine Blue A2G also assures more level dyeings.

Recommended for quality ladies' wear of wool or wool-nylon unions; also for carpet wools when clean, bright effects are desired.

FASTNESS PROPERTIES

LIGHT	5
PERSPIRATION	3
LIGHT FULLING	3
ALKALI	4

For the Textile Bookshelf

Practical Spectroscopy (Dyestuff Technical Bulletin No. 841). A down-to-earth review of spectroscopy as it affects the dyer and a guide to product application of color measuring instruments in identifying and evaluating the strength and fastness properties of dyes.

QUICK TIPS

Ultraviolet Rays Guard Quality: Many piece goods dyers and finishers use ultraviolet light to identify and trace sources of oil, rust, mildew, bad preparation or faulty handling of cloth. Many substances transparent to the human eye will reflect light of a characteristic color when exposed to ultraviolet rays; any variation from the characteristic color indicates contamination and pinpoints the source.

To Prevent "Ending" in Jig Dyeing medium and dark shades—try adding about ⅝ of the dye on the first end and about ⅛ on the second end, rather than adding the dye in equal portions.

Rinsing After Package Dyeing is most effective when cold water is pumped through the packages and to the sewer with no re-circulation. Machines not designed to do this may be overflowed through the sample port and equipped with a valve on the pump return to prevent re-circulation. A fitting made to clamp on the port in place of the cover—plus a large-diameter hose or pipe slipped over this fitting—will direct rinse water to sewer.

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BURKART-SCHIER CHEMICAL CO., CHATTANOOGA, TENN.

CLASSIFIED ADVERTISEMENTS

Advertisements in this section are restricted to HELP WANTED—POSITIONS WANTED—EQUIPMENT wanted or for sale. Rates, effective February 1, 1951: One-time, $10.00 per column inch; 3 consecutive times (same copy), $9.00 per column inch; 13 or more times, $8.00 per column inch; Position Wanted, $2.00 per column inch. Figure 38 average words per column inch. Publisher reserves the right to reject or discontinue any classified advertisement. Replies should be addressed: Box Number . . . c/o American Dyestuff Reporter, 44 East 23rd Street, New York 10, N. Y.

ABSTRACTING SERVICE—Abstracting and digesting of foreign patents and periodicals. Literature review and special reports in dyestuff and cellulose chemistry. PAUL WENGRAF, 88-36 ELMHURST AVENUE, ELMHURST 73, NEW YORK.

CONFIDENTIAL EMPLOYMENT SERVICE

If you are available for a good position in textiles, it will pay you to have your application in our files. Negotiations are confidential through us.

CHARLES P. RAYMOND SERVICE, Inc.
Phone: LIberty 2-6547
294 Washington St., Boston 8, Mass.
Over 55 Years In Business

WANTED: Sales representative with some practical experience and technical ability to cover Georgia, Tennessee, and Alabama, for a major textile chemical company. Accounts already established. Excellent opportunity for right man. Write Box No. 868.

POSITION WANTED: Textile college graduate. Chemist. Diversified experience dyeing, finishing, auxiliaries manufacturing. Good administrative background. Age 33. Seeks responsible position plant or technical sales. Presently assistant superintendent dyehouse; plant chemist. Write Box No. 926.

WANTED: DYER-CHEMIST with technical background, experienced in dyeing wool, raw stock and skeins. Excellent opportunity with future. Age 30-45. Must be willing to relocate. State experience fully in letter. All replies held confidential. Write Box No. 936.

WANTED: FIELD RESEARCH CHEMIST—Permanent position in Textile Research Laboratory of progressive chemical organization for young man possessing a textile chemistry background. Some knowledge of dry cleaning methods helpful but not necessary. Duties involve limited traveling in connection with laboratory research and field service work. In reply give resume of qualifications and salary desired. Write Box No. 933.

DYER WANTED: With technical background or practical experience of at least five years, as night supervisor for Georgia knit goods plant. Write in detail your background and salary desired. Write Box No. 935.

POSITION WANTED: An individual with an exceptional combination of plant, laboratory experience, desires technical-executive position with dyestuff, fiber manufacturer, or textile chemical firm. Textile college graduate. Experience includes Dyer, Finisher, Laboratory Director, Manager. Write Box No. 932.

WANTED: LABORATORY TECHNICIAN, capable of developmental and evaluation work in vinyl and waterproof coatings. Southeastern location. Send resume to Box No. 937.

FOR SALE—A golden opportunity. A going dyeing and finishing business, established in August 1928. Have consistent retail trade in hosiery and lingerie; also wholesale. Buy hosiery in the greige. Have going accounts on commercial dyeing and finishing. Only job dye house in the Middle West on hosiery dyeing. Buyer should know how to dye hosiery. Owner retiring. Write Box No. 938.

E. J. Feeley Co.

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MANUFACTURER OF
TEXTILE CHEMICALS

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1700 WALNUT ST. PHILADELPHIA, PA.
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PYRAZOLINES (FAST DIRECT DYES)
DIPYRAZOS (DEVELOPED DYES)

COLORS FOR WOOL

MANUFACTURED
BY

Pharma Chemical Corporation

● Classified Advertisements ●

POSITION WANTED: TEXTILE CHEMIST AND COLORIST. Director of dyestuff application laboratory. Expert in standardizing, color matching and testing of all classes of dyes on all fibres, dyeing and printing. Considerable experience in technical sales and administration. Seeks responsible position. Will consider sales. Write Box No. 939.

POSITION WANTED: Textile Chemist, (M.S.) desires opportunity for advancement with progressive company. Five years' experience in laboratory and mill in dyeing and finishing of synthetics. Interested in technical service, product development, or demonstrator. Prefer New England, New York, New Jersey. Write Box No. 940.

WANTED: Dyestuffs Chemist with laboratory and plant experience on Azo colors or pigments, including Phthalocyanine blue, by Eastern manufacturer. Excellent opportunity. Our personnel informed of this advertisement. Write Box No. 941.

POSITION WANTED: Highly capable young textile chemist and colorist desires responsible position in dyestuff manufacturers' laboratory or mill. 7 years' laboratory and mill experience, including being in charge of one of the largest dyehouse laboratories in the East. Expert color matcher. Write Box No. 942.

WANTED: Large manufacturer of synthetic resins has excellent opportunity for technical salesman under 35 with minimum of BS in Chemistry (or equivalent). Prefer someone with sales experience in the textile, plywood, or foundry resin field. Permanent position open in Florida-Georgia territory. Write Box No. 943.

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A

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Advertisement

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An extremely fast to light direct

Diazo Navy Blue recommended

for discharge printing

Write for sample and shade card

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New Line of

STAINLESS STEEL PAILS at Big Savings!

New Welded Construction Equals Seamless or Spun

Entirely stainless (no solder) — smooth surfaces—sturdy 24 gauge type 304 analysis stainless—improved shape for easier carrying, better balance — handles, ears, chimes of heavy-duty stainless. Outstanding quality at lowest cost. Backed by Metalsmiths' 30 years' serving process industries.

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PROMPT SHIPMENT

LOWEST PRICES — BIGGEST SELECTION ON THE MARKET

10 qt. - $9.25 ea.
12 qt. - 10.25 ea.
14 qt. - 11.25 ea.
16 qt. - 12.25 ea.
20 qt. - 13.50 ea.
24 qt. - 17.50 ea.

Discounts in quantity

METALSMITHS

Division of Orange Roller Bearing Co., Inc.
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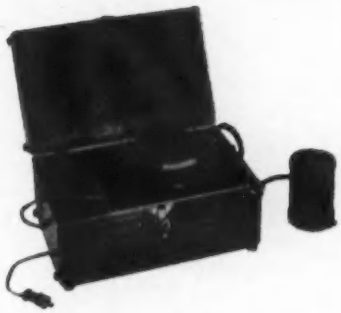
COLOR MATCHING

with

PHOTOVOLT Photoelectric REFLECTION METER



A truly practical precision instrument for color matching and for specifying color by tristimulus values, also for fading and detergency tests . . . for production control and laboratory work.

Portable, sturdy, simple to operate

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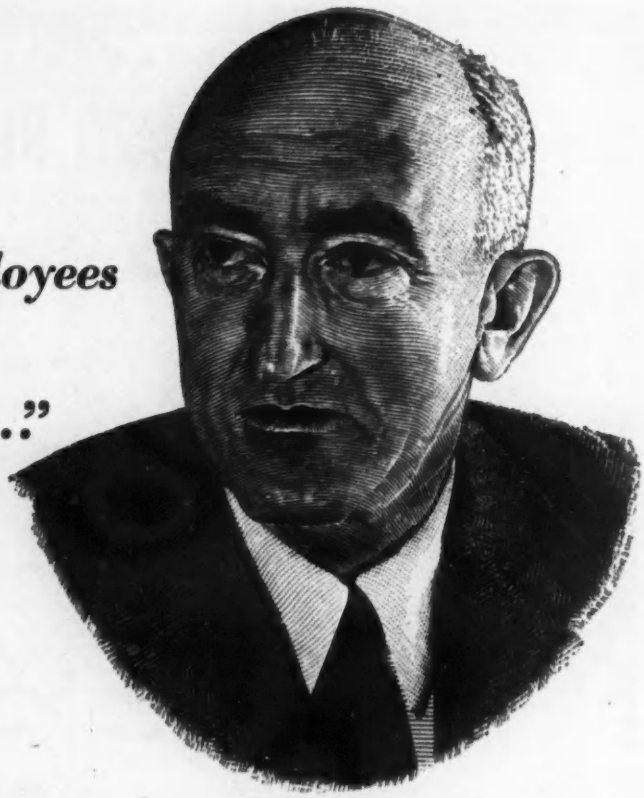

WILLIAM M. ALLEN
President
Boeing Airplane Company

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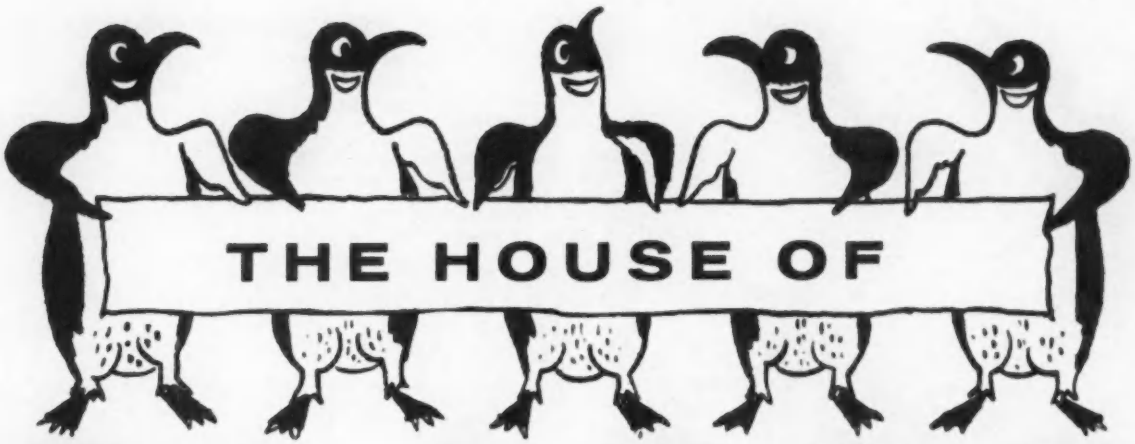

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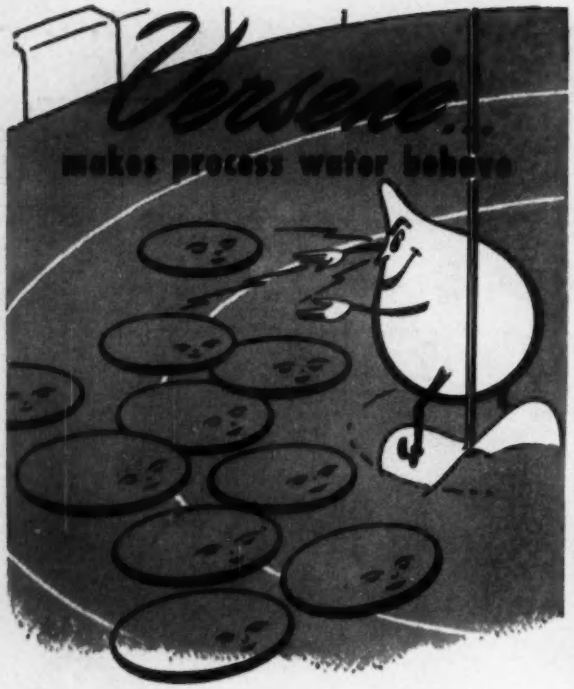

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